

ON THE CLASSIFICATION OF THE
ANAGYRINE ENCYRTIDAE,
WITH A REVISION OF SOME OF THE GENERA
(HYMENOPTERA : CHALCIDOIDEA)



BY

G. J. KERRICH *kwj.*

Commonwealth Institute of Entomology, London

Pp. 141-250, 114 Text-figs., 4 Plates

BULLETIN OF
THE BRITISH MUSEUM (NATURAL HISTORY)
ENTOMOLOGY

Vol. 20 No. 5

LONDON : 1967

THE BULLETIN OF THE BRITISH MUSEUM
(NATURAL HISTORY), *instituted in 1949, is
issued in five series corresponding to the Departments
of the Museum, and an Historical series.*

*Parts will appear at irregular intervals as they become
ready. Volumes will contain about three or four
hundred pages, and will not necessarily be completed
within one calendar year.*

*In 1965 a separate supplementary series of longer
papers was instituted, numbered serially for each
Department.*

*This paper is Vol. 20, No. 5 of the Entomological
series. The abbreviated titles of periodicals cited
follow those of the World List of Scientific Periodicals.*

World List abbreviation
Bull. Br. Mus. nat. Hist. (Ent.).

© Trustees of the British Museum (Natural History) 1967

TRUSTEES OF
THE BRITISH MUSEUM (NATURAL HISTORY)

Issued 1 August, 1967

Price £2 10s.

ON THE CLASSIFICATION OF THE ANAGYRINE ENCYRTIDAE, WITH A REVISION OF SOME OF THE GENERA (HYMENOPTERA : CHALCIDOIDEA)

By G. J. KERRICH

CONTENTS

	<i>Page</i>
KEY TO THE TRIBES OF THE ENCYRTINAE Ashmead	144
CLASSIFICATION OF ANAGYRINI	145
DESCRIPTIVE TECHNIQUE	146
KEY TO GENERA OF THE ERICYDNINA	146
DISCUSSION OF SOME GENERA	151
<i>HUNGARIELLA</i> Erdös	154
Key to species	164
<i>ERICYDNUS</i> Walker	166
Key to species	176
<i>GRANDORIELLA</i> Domenichini	180
<i>CLAUSSENIA</i> Ishii	181
Key to species	187
KEY TO GENERA OF THE AENASIINA subtrib. n.	188
<i>METAPHAENODISCUS</i> Mercet	190
<i>CHALCASPIS</i> Howard	191
Key to species	194
<i>AENASIUS</i> Walker	195
Key to species	219
<i>BLEPYRUS</i> Howard	225
Key to species	227
<i>NEODISCODES</i> Compere	228
Key to species	235
<i>EURYRHOPALUS</i> Howard	235
KEY TO SPECIES	243
ACKNOWLEDGMENTS	246
ADDENDUM	247
INDEX TO NAMES IN HYMENOPTERA	248
INDEX TO HOST NAMES	250

SYNOPSIS

The classification of the main Encyrtid subfamily Encyrtinae is discussed, and a revised key is given for its division into the three generally recognized tribes.

The tribe Anagyrini (= Ectromini Ashmead) is classified into five subtribes, which are characterized. The genera recognized by the author as belonging to three of these are listed or are indicated by reference to literature.

A dichotomous key is given for separation of the genera of the subtribe Ericydnina in both sexes, and some of the genera are briefly discussed. Systematic revisions are given of the species of *Hungariella* Erdös, *Ericydnus* Walker, *Grandoriella* Domenichini and *Clausenia* Ishii.

In the Aenasiina subtrib. n. only the female sex has been studied. A dichotomous key is given for the separation of the six genera, and systematic revisions are given of the species of five of these, for which sufficient material was available.

THE division of the Encyrtidae into three subfamilies, Encyrtinae, Arrenophaginae and Antheminae is generally agreed; but authors have subdivided the largest subfamily, the Encyrtinae, in various ways. This situation has been reviewed by Tachikawa (1963).

Compere has, in various papers, but especially in 1947 and in a rather recent joint communication with Annecke (1960), emphasized the importance of the structure and function of the female gaster in Encyrtid classification. On this basis, the two authors of the latter paper gave a revised key (p. 376) in which Ashmead's tribes of the Encyrtinae were redefined. Tachikawa, in his excellent study of the Japanese Encyrtidae (1963) has accepted this standpoint. Like that Japanese author I give, though in somewhat different form, an expanded version of their key for the purpose of more general generic identification, the nomenclature adopted being that which I have already considered most appropriate (Kerrich, 1964).

ENCYRTINAE

KEY TO THE TRIBES OF THE *ENCYRTINAE* Ashmead

- 1 Styli and paratergites absent. Mandibles apically truncate. Costal cell of hind wing broad **ENCYRTINI** Ashmead
- Styli or paratergites or both present. Mandibles dentate 2
- 2 Paratergites almost always present: styli in most genera absent. Mandibles slender, generally bidentate, sometimes tridentate with three sharp teeth, but never with two sharp teeth and a truncation: female hypopygium usually boat-shaped and usually enclosing the ovipositor **ANAGYRINI** Hoffer 1954
(=Ectromini Ashmead)
- Paratergites absent. Styli always present and distinct, generally movable apart from the plates which bear them. Mandibles never bidentate with equal teeth, generally tridentate, frequently with two sharp teeth and a truncation; female hypopygium very rarely boat-shaped and very rarely enclosing the ovipositor
BOTHRIOTHORACINI Howard 1895
(=Mirini Ashmead)

Compere & Annecke (1960) defined the terms "styli" and "paratergites", which are used in the key to tribes. Paratergites are illustrated by Compere (1947, fig. 6) and on Pl. I of the present paper. In the Anagyrini the entire ovipositor is everted, and apparently the paratergites serve as hinge plates: in repose the ovipositor is completely enclosed by the sterna to the apex of the abdomen, the apical sternum being enlarged and pointed. In the Bothriothoracini the recurved sides of the true eighth tergum adhere closely to the lateral margins of the tenth tergum without having any plate between them, and the styli are present and generally movable apart from the plates that bear them: the styli are seldom completely enclosed by the apical sternum, and in the act of oviposition only the shaft of the ovipositor extrudes. The Anagyrini are parasites of mealybugs.

I became interested in Dr. Compere's ideas on Encyrtid classification in the course of prolonged correspondence with him on the subject of a number of genera, principally Anagyrine, that I had received for study (e.g., Kerrich, 1953). When I visited him in 1956, he not only enabled me to study the incomparable material located at Riverside, but also initiated me into his ideas on the subdivision of the

Anagyrini. He has not wished to undertake the furtherance of these ideas himself, but has desired me to develop them in connection with the revision of a number of the genera. For this enlightenment and impetus I wish to express my deepest gratitude.

CLASSIFICATION OF ANAGYRINI

ANAGYRINI

The Anagyrini are here divided into five sub-tribes in the following manner:

1. **Anagyrina** (*sec.* Anagyrini Hoffer, 1954). This sub-tribe is characterized by having the tenth tergum of the female enormously enlarged, so as to cover the greater part of the abdomen (Pl. I, fig. 1 and Compere, 1947, fig. 6). The paratergites are long and narrow. The head is of normal shape, and is neither strongly sclerotized nor coarsely punctate. Many of the genera were included in the key given by Compere, and others were adduced by Burks (1952). Other genera belonging here are *Anusia* Förster, 1856, *Doliphoceras* Mercet, 1921, *Ectromatopsis* Compere, 1947, *Paraenasioidea* Hoffer, 1954, *Leptanusia* De Santis, 1964 *Aglyptoideus* De Santis, 1964 and *Alamella* Man Mohen, 1966.

2. **Ericydnina** (*sec.* Ericydnini Hoffer, 1955, also Ericydnina Erdös & Novicky, 1955). This group is negatively characterized by not having the tenth tergum of the female enormously enlarged, as in the first subtribe, nor the head as in the two following. The paratergites, usually present, are long (Pl. I, fig. 2), and still more slender than in the first group. The male antennae are long-hairy in several genera and ramose in some (e.g., Text-fig. 19). A key to the genera is given below, for both sexes where known, except for the close relatives of *Xanthoencyrtus* already dealt with in the important paper of Ghesquière (1956).

3. **Aenasiina subtrib. n.** These are stout-bodied forms with a rigid integument, and some of them have a close superficial resemblance to such genera as *Bothriothorax*. The head is strongly sclerotized and coarsely punctate, often with strong thimble-punctures, and in some genera it is menisciform (see numerous Text-figures following). The fore femora are decidedly stout. The mandibles are often tridentate, in which case the middle tooth is the longest. The paratergites are widened basally near the cerci and taper to hairline thickness apically (Pl. II, fig. 1). Short, wide styli are present. The males have not been studied, but for the females a key to the six genera is given below, and the species of all but one of these genera are revised.

4. **Dinocarsiina** (*sec.* Dinocarsiini Hoffer, 1952). These genera are characterized by having a rather strongly sclerotized, broadened head, usually with the facial area sunk, and bordered by a very sharp ridge, and by having relatively much broader paratergites (Pl. II, fig. 2). In most genera the submarginal vein runs up to junction of the postmarginal and radial, and the marginal is virtually absent; but in the European genera *Dinocarsis* and *Dicarnosis*, which lack the sharp margin to the facial impression, the marginal vein is distinct but not contiguous with the wing margin, and the postmarginal is absent or vestigial. A cleared preparation of *Dinocarsis* shows the broad paratergites. The genera belonging here are *Dinocarsis* Förster, 1856, *Dicarnosis* Mercet, 1921, *Zarhopalus* Ashmead, 1900, *Acroaspidia*

Compere & Zinna, 1955, *Coelaspidia* Timberlake, 1923, *Chrysoplatycerus* Ashmead, 1889, *Hambletonia* Compere, 1936, *Tropidophryne* Compere, 1931, *Neoplatycerus* Subba Rao, 1965 and *Zaplatycerus* Timberlake, 1925. The present author plans a study of these genera to be published in a subsequent paper.

5. **Aphycina** (*sec.* Aphycini Hoffer, 1954). A key to the genera was given by Compere & Annecke (1960, p. 37). The group is characterized as small, not heavily sclerotized insects, with frontovertex and dorsum of thorax often more or less velvety in appearance. The female hypopygium is boat-shaped and sharp to flatter or even more roundedly truncate at apex, and the ovipositor often projects by about a quarter the length of the gaster. Paratergites are present in some genera. The fore wings have the marginal vein not much longer than broad, the radial rather short and the postmarginal very short. Kerrich (1964) has transferred *Dusmetia* Mercet, 1921 to this group. The curious *Anagyrietta* Ferrière, 1955 seems best placed here.

DESCRIPTIVE TECHNIQUE

Descriptions and redescriptions have been made comparatively. All species treated have been compared in all respects mentioned with the species most closely related to them and, where relative terms are used, it is to be assumed that "very weakly", "weakly", "rather weakly", "moderately", "rather strongly", etc. represent gradations.

It is important that the conditions of illumination under which the descriptions have been made should be understood. Whereas a strong spotlight has been used for illumining shapes, especially those of smaller structures such as mandibles and antennal segments, it has not been used for colour or finer sculpture, which have been studied with good daylight supplemented by an ordinary bench lamp. When an insect having structural colour is examined with a spotlight, this penetrates to the underlying melanin, and the structural colour disappears from view or becomes greatly changed. Likewise, a spotlight eliminates or reduces fine shadow, so that fine striation or microsculpture may disappear from view, and all but the coarsest punctures may appear smaller than they really are. Punctures seem more reliably viewed from the side than from in front or behind. It may be necessary to view the punctures without a spotlight, and then to turn the spotlight on in order to view the hairs that arise from them.

Venation has been viewed, so far as possible, with good transmitted daylight only. Artificial light, even from a bench lamp, may cause reflections from the wing margin, and the edges of the veins and even from hairs, making the precise limits of the veins, especially when they are almost colourless, very difficult to observe.

Where wing proportions are quoted, the length has been measured from the apex of the tegula.

ERICYDNINA

KEY TO GENERA OF THE *ERICYDNINA*

- | | | |
|---|---|---|
| 1 | Antennal funicle 5-segmented in both sexes, ramose in male: [frontovertex relatively broad] | 2 |
| | Antennal funicle 6-segmented in both sexes, seldom ramose in male | 4 |

- 2 Brachypterous in both sexes: whole thorax flattened in both sexes, the scutellum very little raised above metanotum: antennae of female moderately compressed and strongly clavate, of male with three long rami: New Zealand, Campbell Is.

ANTIPODENCYRTUS Kerrich, 1964

Brachypterous forms unknown: scutellum well raised above metanotum: antennae of female otherwise, of male with more than three rami 3

- 3 Scutellum normally convex and moderately shining: fore wings more or less clear, and with submarginal vein strongly arcuate in both sexes (Text-figs. 21-24): male antennae with four long rami and a vestige (Text-fig. 19): female antennae moderately compressed and moderately clavate (Text-fig. 20)

HUNGARIELLA Erdős, 1955

(= *Tetracnemus* Timberlake, 1929 *non* Westwood, 1837)

Male very much as above, but antennae with a small but distinct fifth ramus.

Female having scutellum flattened above and dull, the fine reticulate microsculpture strongly outstanding: antennae notably stout and very strongly compressed: fore wings with a broad band of infuscation across middle and with submarginal vein only moderately arcuate: Australia **ANARHOPUS** Timberlake, 1929

- 4 Brachypterous, i.e. very short-winged forms 5
Macropterous, or with wings not greatly reduced 8

- 5 Head, seen from above, semilunar: eyes nearly reaching back of head, always distinctly pubescent: lateral ocelli close to eye margins: frontovertex not shining, but with reticulate microsculpture very fine to moderate, and beset with moderate punctures that commonly are separated by about their own diameters though they may be very sparse in middle before median ocellus: mesoscutum of normal proportions, its median length decidedly greater than that of pronotum: scutellum laminate at apex: propodeum of normal length, with a pair of transverse keels (Text-figs. 27-29) and also a pair of longitudinal keels which run back from the spiracles and often border a spiracular sulcus **ERICYDNUS** Walker, 1837

Head otherwise, more or less lenticular: eyes not nearly reaching back of head, not or not distinctly pubescent: lateral ocelli remote from eye margins: frontovertex shining, with punctures extremely sparse and fine: mesoscutum uncommonly strongly transverse, its median length approximately equal to that of pronotum, or sometimes considerably less: scutellum not laminate: propodeum without such keels 6

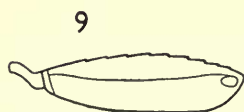
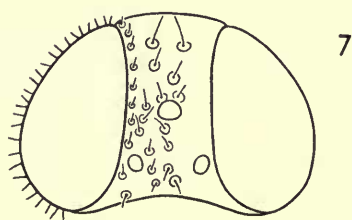
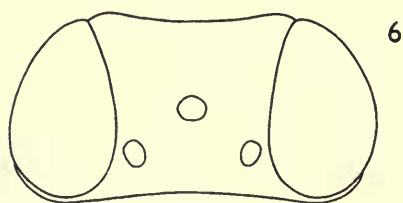
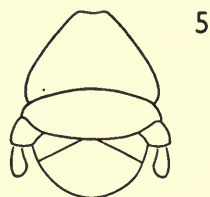
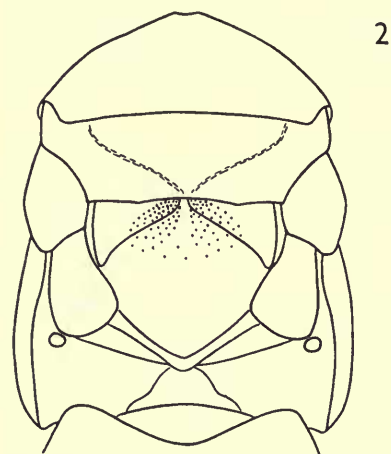
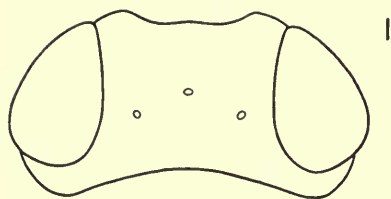
- 6 Head, seen from above, very strongly transverse (Text-fig. 1): toruli distinctly a little above lower level of eyes, separated from mouth by much more than their own length: antennae with scape elongate and slender, reaching far above top of head, and with funicle segments all decidedly longer than broad: scutellum with a pair of basal fossae (N.B. not in macropterous form!): propodeum of normal proportions, with a distinct median area bordered by sharp keels (Text-fig. 2)

AGLYPTUS Förster, 1856

(= *Ectroma* auctt. *non* Westwood)

Head less strongly transverse: toruli below lower level of eyes, separated from mouth by about their own length: antennae with scape not over-reaching top of head, and with funicle segments less elongate, the sixth about quadrate or transverse: scutellum without basal fossae: propodeum very short in middle and with no distinct median area 7

- 7 Eyes of normal proportion, each one, as seen from above, about half breadth of frontovertex (Text-fig. 4): antennal scape rather slender, over four times as long as broad: pronotum conical, about half as long as broad and one and a half times median length of the mesoscutum (Text-fig. 5): axillae contiguous or almost so: first large tergite about half the total length of gaster . **AQUAENCYRTUS** Hoffer, 1953



- Eyes relatively small, each one, as seen from above, about a quarter the breadth of frontovertex: antennal scape stout, much less than twice as long as broad; pronotum little more than a quarter as long as broad and about equal in length to the mesoscutum: axillae widely separated: first large tergite much less than half the total length of gaster **NEODUSMETIA** Kerrich, 1964
- 8 Lateral ocelli remote, i.e. much more than their own diameters, from eye margins 9
Lateral ocelli close to eye margins, i.e. about their own diameters therefrom, or sometimes still closer 16
- 9 Male antennae ramose: ovipositor strongly exerted: in both sexes antennal club solid and postmarginal vein very short 10
Male antennae not ramose: ovipositor not or only weakly exerted, or if it is strongly exerted (*Ericydus caudatus* Erdös) the antennal club is 3-segmented and the postmarginal vein is decidedly long 11
- 10 Head more or less rounded in front: frontovertex with reticulate microsculpture (as microsculpture) regular, coarse and strongly outstanding: mandibles bidentate: marginal vein several times as long as broad, and radial emitted at nearly a right angle to it: antennal flagellum in female strongly compressed, in male with four long rami borne on segments 2-5: female with fore wings strongly bifasciate; with scutellum strongly shining, beset with very fine and sparse piliferous punctures in about basal half, and with microsculpture exceedingly fine
TETRACNEMUS Westwood, 1837
(= *Tetracladia* Howard, 1892, *Masia* Mercet, 1919, *Comperencyrtus* De Santis, 1964)
- Head quite strongly emarginate in front: frontovertex with reticulate microsculpture fine, not strongly outstanding: mandibles sharply tridentate, the lowest tooth a little set back; marginal vein rather short, i.e. hardly three times as long as broad, and radial emitted at about 45° with it: antennal flagellum in female not strongly compressed, in male with five long rami borne on segments 1-5: female with wings hyaline; with scutellum rather dull, beset with sparse piliferous punctures, the reticulate microsculpture becoming coarser toward apex but not strongly outstanding **PENTACLADOCERUS** Erdös, 1964
- 11 Head markedly broader than thorax (Text-figs. 1-2): antennae with scape elongate and slender, reaching far above top of head: scrobes absent or shorter than toruli: marginal vein several times as long as broad, almost parallel-sided (Text-fig. 3 and Timberlake, 1926, fig. 1): males unknown 12
Head not or little broader than thorax: antennae with scape not reaching, or at any rate not reaching far above, top of head: scrobes longer than toruli: marginal vein shorter, markedly expanded to point at which radius is emitted 13
- 12 Eyes not nearly reaching occiput, which is not sharply margined: ocelli in a very obtuse triangle (Text-fig. 1): scrobal impression distinct though not sharp: toruli higher on face, their lower margins about on lower level of eyes: mesoscutum with fore and hind margins sub-parallel, with notauli sharply but weakly impressed: scutellum not small, about twice length of mesoscutum, obtusely round-pointed at apex (Text-fig. 2): fore wings rather narrow but of more or less normal shape,

FIGS. 1-10. 1-3. *Aglyptus lindus* Först., female. 1, head, seen from above; 2, thorax, propodeum and base of gaster of brachypterous form, seen from above; 3, part of right fore wing. 4-5. *Aquaencyrtus bohemicus* Hffr., female. 4, head, seen from above; 5, part of thorax, seen from above. 6. *Grandoriella lamasi* Domen., female head, seen from above. 7. *Parastenoterys bollowi* (Mercet), female head, seen from above; 8. *P. flaviclava* De S., propodeum, drawn from specimen in Madrid museum; 9. *Dinocarsiella alpina* (Grlt.), right antennal scape of female in dextro-lateral view; 10. *Xanthoectroma aquilinum* Mercet, female, left antennal scape in dextro-lateral view.

hyaline except for some weak infuscation below the radial vein but normally hairy: radial vein longer than marginal, and postmarginal very short (Text-fig. 3): Europe

AGLYPTUS Förster, 1856

(= *Ectroma* auctt. non Westwood)

Eyes nearly reaching occiput, which is sharply margined: ocelli in a slightly obtuse triangle: face without scrobal impressions: toruli lower on face, their upper margins about on lower level of eyes: mesoscutum considerably longer medially than at sides: scutellum small, about two-thirds length of mesoscutum, acutely round-pointed at apex: fore wings spatulate, broadly constricted before marginal vein and with apical half oval, in greater part strongly infuscated and hairy, but with five bare hyaline areas: radial vein decidedly shorter, and postmarginal slightly shorter, than marginal: Australia . . . **VOSLERIA** Timberlake, 1926

- 13 Fore wings strongly infusate and dark-hairy, with hyaline areas densely beset with paler hairs: ocelli in a small, acute-angled triangle, the lateral about three times as far from orbital as from occipital margin: antennal scape several times as long as broad, rather strongly dilated below for its whole length, and sub-parallel sided for about half its length (Text-fig. 9): [funicle segments much longer than broad, beset with rather strong, and in male rather long, hairs]

DINOCARSIELLA Mercet, 1921

Fore wings hyaline or with infuscation weak: ocelli in a large, obtuse-angled triangle: antennal scape shaped differently 14

- 14 Notauli sharply and strongly impressed, very distinct (Mercet, 1925, fig. 1); in position rather as in *Aglyptus* illustrated in Text-fig. 2 but much stronger: propodeum relatively long, about half length of scutellum: antennal scape (Text-fig. 10) about reaching top of head, elongate, about six times length of its greatest breadth, in about basal two-thirds distinctly but weakly dilated below, in apical third narrower than greatest width of pedicellus: funicle segments all much longer than broad, not markedly hairy: male unknown **XANTHOECTROMA** Mercet, 1925

Notauli not distinct: propodeum short: antennae with scape relatively much shorter, not nearly reaching top of head, and with funicle segments relatively shorter and markedly hairy 15

- 15 Males: rather stout-bodied, moderately sclerotized insects of medium brown colour: head normally hypognathous: eyes not appreciably hairy: pronotum moderately emarginate behind: antennae sparsely beset with short, stiff hairs, the funicle segments about quadrate to transverse and the club solid: wings with post-marginal vein not very much shorter than radial **NEODUSMETIA** Kerrich, 1964

Both sexes: rather elongate, flattened insects, the females pale yellow to pale brown but the males darker: head of male somewhat forwardly-directed, of female strongly so and with toruli very close to oral margin: eyes strongly though rather sparsely hairy: pronotum deeply emarginate behind: antennae of female rather densely hairy, with funicle segments sub-quadrate to strongly transverse and club 3-segmented, of male bearing rather long hairs, with funicle segments well separated, elongate-moniliform, and with club solid: wings with postmarginal vein very short **XANTHOENCYRTUS** Ashmead, 1902

(and closely related genera, see Ghesquière, 1956)

- 16 Marginal vein stout, about twice as long as broad: sub-marginal greatly and sharply expanded near apex, i.e. at junction of the obsolete basalis: postmarginal very short and frontovertex decidedly broader than an eye: small, stout-bodied insects, of length about 0.7 mm., with proportionately short antennae and legs, and without green or purple coloration: eyes relatively densely hairy

PAURIDIA Timberlake, 1919

Marginal vein relatively slender, usually quite three times as long as broad, at least in female: submarginal vein not thus expanded: if the postmarginal is very short, the frontovertex is narrower than an eye: larger insects with bright coloration 17

- 17 Frontovortex decidedly broader than an eye: marginal vein long and narrow, several times as long as broad (in case of doubt the scutellum laminate at apex), and postmarginal distinctly longer than marginal: propodeum with a pair of transverse keels which, at sides, bend round and run to hind margin, not with a distinct median keel (Text-figs. 27-29): elongate, slender forms, with antennae and legs of female decidedly elongate: antennae of female slightly compressed, of male generally rather more so, and not with long stout hairs 18
- Frontovortex of female generally decidedly narrower than an eye, seldom slightly broader: marginal vein about three times as long as broad: scutellum not laminate at apex: forms not especially elongate and slender, and with antennae otherwise 19
- 18 Scutellum sharply margined at apex but not laminate, strongly raised above propodeum: propodeum with no keel running back from spiracle and with no distinct median area: head in both sexes relatively broad (Text-fig. 6): styli (ovipositor sheaths) not developed: no distinct sexual dimorphism in form of antennae, which have the pedicellus relatively short in both sexes: micropterous forms unknown: Peru to southern California **GRANDORIELLA** Domenichini, 1951
- Scutellum weakly to strongly laminate at apex, not strongly raised above propodeum: propodeum having a keel (present but difficult to see in *japonicus* (Tachikawa)) that runs back from the spiracle and often borders a sulcus, and usually having a distinct median area: head of female generally relatively narrow: styli strongly developed, though often concealed: distinct sexual dimorphism in form of antennae, the males having the pedicellus relatively short and the flagellum relatively elongate, the females not so: Europe, Japan, California **ERICYDNUS** Walker, 1837
- 19 Antennae of female having scape greatly dilated below and flagellum greatly flattened, of male compressed and ordinarily strongly hairy, not with long, stout hairs, the funicle segments strongly transverse in both sexes: postmarginal vein very short: fore wings of female deeply infusate, with a hyaline fascia: Australia **ANUSOIDEA** Girault, 1926
- Antennae of female having scape not greatly dilated and flagellum not greatly flattened, the funicle segments not strongly transverse in either sex: marginal vein about three times as long as broad and postmarginal a little longer or shorter than marginal: wings hyaline 20
- 20 Head rather elongate: eyes with pilosity sparse but strong (Text-fig. 7): frontovortex with reticulate microsculpture regular and of moderate strength, giving the surface a more shining appearance, the punctures before the ocelli large and of almost moderate depth (Text-fig. 7): upper mandibular tooth very sharp and much the longer: propodeum rather shining above, with a strongly raised median keel, and sharply margined at sides (Text-fig. 8): larger, quite strongly sclerotized insects: South America **PARASTENOTERYS** Girault, 1915, De Santis, 1964
(= *Parencyrtus* Mercet, 1928 non Ashmead, 1900)
- Head much more transverse: eyes with pilosity of moderate strength and density (Text-figs. 36-37): frontovortex with reticulate microsculpture fine but irregular, giving the surface a dull appearance, the punctures before the ocelli small and superficial: mandibles clearly bidentate, the teeth subequal, the upper tooth rather rounded at apex: propodeum with very superficial reticulate microsculpture, with no distinct median area or keel, and not sharply margined at sides: smaller, rather weakly sclerotized insects, predominately purple and green in colour: Asia, Africa. **CLAUSENIA** Ishii, 1923

DISCUSSION OF SOME GENERA

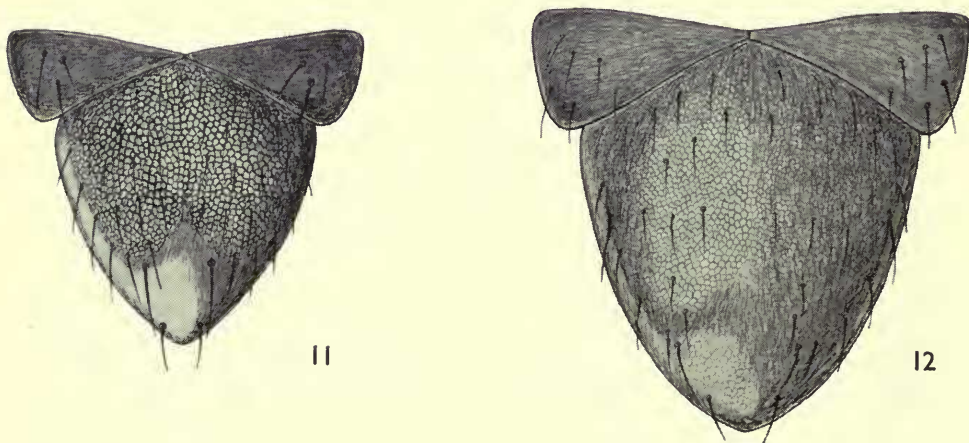
Dinocarsiella Mercet. Dr. A. Hoffer kindly sent me material of *Dinocarsiella* Mercet. A cleared preparation of a female specimen shows slender paratergites.

I consider the genus not to be closely related to *Dinocarsis* Förster but to belong in the Ericydnina, and in consequence I have included it in the above key.

Pentacladocerus Erdős. The position of this genus is more problematic. Dr. J. Erdős kindly sent me on loan a female specimen of *P. matranus* Erdős, which has enabled me to make direct comparison with *Tetracnemus* Westwood. There is considerable resemblance between the two, notably in the boat-shaped female hypopygium and projecting ovipositor and in the ramose male antennae. However *Pentacladocerus* has the mandibles, which Erdős did not describe, sharply tridentate, with the lowest tooth a little set back.

Comperencyrtus De Santis, 1965. De Santis gave a careful description and figure of a new genus *Comperencyrtus* based on a single male. A paratype in the British Museum (Natural History) of *Tetracladia hispanica* Mercet agrees with this description in all respects except that it lacks the pair of longitudinal carinae on the middle of the propodeum, that the sixth funicle segment is relatively a little longer, and that I believe the eyes to be hairy, though only very weakly and sparsely so. Consequently I place *Comperencyrtus* De Santis in synonymy with *Tetracnemus* Westwood (syn. n.).

Parastenoterys Girault, De Santis. I have examined material from the Madrid museum treated by Mercet (1928) as *Parencyrtus* Ashmead, and also female paratypes of *Parastenoterys flaviclava* De Santis, and am fully satisfied that these are congeneric. I agree with De Santis that Mercet should not have placed the species he treated in *Parencyrtus*, since Ashmead placed this genus in the "Mirini", with tridentate mandibles, and also described the postmarginal vein as much longer than the marginal, and the propodeum as short. Dr. Burks has informed me that the unique type of *Parencyrtus brasiliensis* Ashmead was missing from the pin when the H. H. Smith collection came to Washington.



FIGS. 11-12. *Parastenoterys* species, females. Scutellum of 11, *P. flaviclava* De S. and 12, *P. bollowi* (Merc.). G. Viggiani del.

Provisionally, I accept De Santis' placement of the South American species in the genus *Parastenoterys* Girault, though I am not fully convinced that this will stand. The South American species have the two mandibular teeth very unequal, the propodeum with a median area of normal proportions containing a strong median keel, and the styli absent or concealed. *Parastenoterys punctatus* Girault was described as having two equal mandibular teeth, and this is to be accepted since, from Girault's method of crushing the head on a slide, they should have been clearly visible. The propodeum is strongly margined at sides as in the South American species, but has the median area more than a third the width of the sclerite and strongly reticulate rugose, with no defined median keel. The very regular, close thimble-punctuation of the mesopleura is a remarkable feature. Contrary to Girault's description there are, in fact, shortly projecting styli as indicated by Girault for *Parectromoides*, which he himself declared to be congeneric.

The specimen in the Madrid museum labelled as *Parencyrtus brasiliensis* Ashmead in Mercet's writing I believe to be a large, pale form of *Parastenoterys flaviclava* De S. The frontovertex is one-quarter wider than an eye, with ocelli in a slightly obtuse triangle; the scutellum in greater part has the reticulate microsculpture very strongly outstanding, but on hinder part and at sides is quite smooth and strongly shining (Text-fig. 11): the antennal scape is five times as long as broad. In *bollowi* Mercet the frontovertex is narrower than an eye, with ocelli in a decidedly acute triangle (Text-fig. 7): the scutellum in greater part has the reticulate microsculpture rather strong, though decidedly less outstanding than in *flaviclava* De S., and in hinder part is more shining but not strongly so, with the reticulate microsculpture, though weak, quite distinct (Text-fig. 12): the antennal scape is seven times as long as broad. I believe the other specimens placed by Mercet as *brasiliensis* to belong to a different species.

Calliencyrtus De Santis, 1959 and **Heteroleptomastix** Ishii, 1928. De Santis, in describing his new genus *Calliencyrtus*, related it to *Heteroleptomastix* Ishii. Conversely Tachikawa (1963, p. 51) considered *Heteroleptomastix* as allied to *Calliencyrtus*. The latter author further (pp. 51, 56-8) compared *Heteroleptomastix* and *Calliencyrtus* with a form that he considered to be a *Grandoriella* but which is shown below to be an *Ericydnus*. He stated "To determine whether *Heteroleptomastix* belongs to a true Ectromini or not, further study may be necessary."

I have not seen any *Heteroleptomastix*, but Prof. De Santis has very kindly sent me on loan the unique type of his species *C. bucculentus*. This confirms the general resemblance between the two genera evident from the drawings of De Santis (1959) and Ishii (1928, p. 105) respectively, though I do not see that the pronotum is significantly more strongly developed in *Calliencyrtus*.

Examination of *Calliencyrtus* shows the following: (1) mandibles decidedly stout, with three sharp teeth, the uppermost slightly the weakest, (2) paratergites absent, (3) ovipositor arising well before apex of gaster. I consider that the genus should be excluded from the Anagyrini. Ishii figured the mandible of *Heteroleptomastix* as being stout, and as having two rather sharp teeth and something of a truncation: I believe this genus should be excluded from the Anagyrini also.

HUNGARIELLA Erdős, 1946

1946 *Hungariella* Erdős, *Annls hist.-nat. Mus. natn. hung.* **39** : 144-5.

1929 *Tetracnemus* Westwood ; Timberlake, *Univ. Calif. Publs Ent.* **5** (2) : 5-11 [Mis-identification].

1951 *Tetracnemus* Westwood ; Kryger, *Ent. Meddr* **26** : 116-21 [Mis-identification].

1955 *Hungariella* Erdős, *Acta zool. hung.* **1** (3-4) : 216-8.

Our knowledge of this genus really dates from the paper of Timberlake (1929), who gave a very full description of a new species *pretiosa*, which was being cultured at the Citrus Experiment Station, Riverside, California. Timberlake's generic identification followed that of Howard who at first (1890, 1892) quoted Westwood's description of *Tetracnemus diversicornis*, redrew his figure of that insect, and in the latter paper proposed a tribal name Tetracnemini for a group of genera of Encyrtidae having branched antennae in the male. Later, as stated by Timberlake, Howard received from New Zealand a species of the genus now under review, attributed it to *Tetracnemus* Westwood and gave it the manuscript name *brownii*. Timberlake (1929) validated *brownii* by a brief comparison with *pretiosa*.

Ashmead (1904) and, following him, Schmiedeknecht (1909) placed *Tetracnemus* in the tribe Ectromini, containing a number of other genera such as *Leptomastix* Förster, *Anagyrus* Howard and *Aglyptus* Förster (= *Ectroma* auctt. non Westwood), which were not included by Howard in his concept of the Tetracnemini.

The Howard-Timberlake interpretation was accepted by Compere (1939), Peck (1951), Kryger (1951), Nikol'skaya (1952) and Ferrière (1955, 1957). Kryger (op. cit.) redescribed the species believed to be *Tetracnemus diversicornis* Westwood. It was not accepted by Mercet (1921, 1922, 1932), Erdős (1955), who considered *Tetracnemus* Westwood to be a *genus dubium*, and Hoffer (1959). Erdős meanwhile (1946) had described *Hungariella piceae* gen. et sp. nov. In 1955 he established the identity of *Hungariella* with *Tetracnemus* auctt. and considered his species *piceae* to be the same as that attributed by Kryger to *diversicornis*.

The supposed *diversicornis* were redescribed further and in both sexes by Ferrière (1955). Ferrière in 1955 considered *diversicornis* Westwood Kryger and *piceae* Erdős as provisionally distinct, but in 1957 he wrote that they were probably synonymous. I have compared a male paratype of *piceae* with material redescribed by Ferrière, and am quite satisfied that they belong to the same species.

The various arguments need not be repeated here, for the controversy has now been settled by Graham (1959), who has rediscovered the long-lost type of *Tetracnemus diversicornis* and shown it to be a senior synonym of *Tetracladia hispanica* Mercet. We must, therefore, follow Erdős in placing all species of *Tetracnemus* auctt. in his genus *Hungariella*.

Head from above biconcave, rather strongly to strongly emarginate anteriorly and posteriorly (Text-figs. 13, 15, 17) ; with eyes nearly reaching or over-reaching the occipital margin, pubescent : frontovertex decidedly broader than an eye, more or less finely reticulate : toruli obovate, separated from mouth by about their own breadth (Text-figs. 14, 16, 18) : common scrobal impression large, extending to about half way up orbits or more. Mandibles bidentate. Antennae of moderate length, distinctly but not strongly clavate : scape in female not or but little dilated below : funicle 5-segmented, usually with first segment the longest and second the shortest (Text-fig. 20). Thorax convex and moderately deep dorsoventrally : axillae slightly

separated. Propodeum with distinct, fine reticulation in middle, then almost smooth to spiracles, reticulate again on sides. Legs of ordinary length and structure. Fore wings differing from description of those of *Clausenia* Ishii as follows: submarginal strongly arcuate at junction with the obsolete basalis, so that the costal cell is not nearly parallel-sided, having several stout hairs on the basal abscissa and a closer row of rather smaller ones on prestigma: marginal vein about twice or less as long as broad, and postmarginal reduced to a mere stub (Text-figs. 21-24).

Species prominently a rather bright green, at least on frontovertex and mesoscutum, and usually on propodeum: scutellum in most bronzy: legs mostly stramineous, yellow-stramineous or pale testaceous. Mandibles, unless otherwise stated, pale brown, darker at apices.

Male differs as follows—head with frontovertex relatively much wider than in female, and with ocelli larger and more outstanding. Toruli separated from mouth by a little less than their own length. Antennae (Text-fig. 19, see also Compere, 1939, fig. 2, Ferrière, 1955, fig. 26) with scape always shorter and broader than in the female of the same species, not nearly reaching top of head even in *piceae* Erdös; ramose, having one long ramus arising from base of first funicle segment and one arising at apex of each of the three following: funicle sparsely long-hairy on segments and rami, and club more densely hairy, with shorter but still prominent hairs.

Altogether duller coloured than the female, having the green colour much darker, sometimes indistinct or replaced by blue, and having a greater amount of dark colour on the legs.

Type-species *H. piceae* Erdös, 1946.

The species that has been best known, *H. pretiosa* (Timberlake), 1929, is probably also the most typical, and in this work the other species are described mainly in relation to it. *H. piceae* is a rather isolated species.

Hungariella pretiosa (Timberlake)

(Text-figs. 15-16, 21)

1929 *Tetracnemus pretiosus* Timberlake, *Univ. Calif. Publ. Ent.* **5** (2): 5-11.

1939 *Tetracnemus pretiosus* Timberlake; Compere, *Ibidem*, **1** (4): 60-1.

Head from above (Text-fig. 15) rather strongly emarginate anteriorly and strongly so posteriorly; with eyes not quite reaching occipital margin; with lateral ocelli about their own diameters from orbital margin; in facial view with cheeks almost straight and, as described by Timberlake, converging to the rather broad oral margin (Text-fig. 16). Eyes moderately hairy, distinctly so $\times 65$. Frontovertex with reticulation of moderate strength and rather regular, the superimposed punctures mentioned by Timberlake difficult to discern: sides of face and inter-scorbal prominence more finely scaly-reticulate, the cheeks very weakly so.

Antenna as described and figured by Timberlake (1929), notably the scape elongate but not nearly reaching top of head, and the first funicle segment about $2\frac{1}{2}$ times as long as broad, longer than any of the four following segments.

Reticulation on mesoscutum about as on frontovertex, less outstanding on axillae and often finer on scutellum.

Fore wings moderately infusate beyond speculum; with prestigma considerably thickened; with marginal vein nearly twice as long as broad; with speculum traversing the radius, which is emitted at a not very acute angle (Text-fig. 21).

Head in greater part, mesoscutum and sides of propodeum metallic green with brassy to, in places, bronzy reflections: propodeum above a paler, brighter green (weakly developed in paratype series): scrobal impressions, pronotum at sides, axillae, scutellum and usually mesopleura bright bronzy: occiput, pronotum above and sternal regions brownish to blackish with weaker metallic reflections, gaster the same, but with first large tergite mainly blue-green. Antennae pale brown, with weak metallic green reflections, much paler on about basal third of scape, and on pedicellus at apex and beneath. Legs having hind coxae except at extreme apex,

and mid coxae at extreme base, as sides of gaster but paler; otherwise mainly yellow-stramineous, the tarsi, tibiae and hind femora above tending to rufo-testaceous, the tarsi infusate at apex.

Male differs as follows: punctation on frontovertex less difficult to discern and reticulations rather finer than in female, but on sides of face and inter-scröbal prominence similar to that on frontovertex. Antennae, as in most species, with fourth ramus very distinctly over-reaching fifth funicle segment: club about one-fifth longer than scape without radicle. Sculpture of mesoscutum, scutellum and mesopleura about as in female. Fore wings relatively considerably broader, and with postmarginal more reduced.

Altogether duller coloured than female: head and mesoscutum a very much darker green or almost blue, the scröbal impressions not markedly different: axillae, scutellum and mesopleura much less bronzy: remainder of body mostly brownish black with weak metallic reflections, the propodeum green only at sides and the first large tergite not markedly green. Antennae pale brown, with weak metallic reflections; with scape flavo-testaceous in about basal two-thirds. Fore and mid coxae broadly at base, hind femora and tibiae except at base and beneath, and hind tarsi brown with metallic reflections: fore and mid tibiae very slightly darkened in part.

Redescribed from a series of 18 ♀, 11 ♂. The stocks originated from AUSTRALIA: New South Wales, Sydney, *ex Pseudococcus fragilis* Brain, em. i-iii. 1928 (*H. Compere*) (see Timberlake, 1929) and have since been reared in California in the insectaries at Riverside and Fontana. The series also includes 3 ♀, 2 ♂ reared vi-vii. 1931 from *Pseudococcus longispinus* Targ. (= *adonidum* auctt.) at Epping, N.S.W., by S. Flanders.

Timberlake (1929) figured the antennae in both sexes of this species as did Compere (1939) for his species *peregrina*. Comparison of these published figures of the male antennae would appear to show a considerable difference not only in the relative length but also in the proportion of the antennal club, but a study of dry specimens indicates that this is largely illusory. Compere evidently drew an antenna in which the whole width of the compressed club segment was apparent, whereas Timberlake must have drawn one in which the club was turned more or less sideways.

Hungariella piceae Erdös

(Text-fig. 14, Pl. III)

1946 *Hungariella piceae* Erdös, *Annls hist.-nat. Mus. natn. hung.* **39**: 145-7.

1951 *Tetracnemus diversicornis* Westwood; Kryger, *Ent. Meddr* **26**: 119-21.

1955 *Tetracnemus diversicornis* Westwood; Ferrière, *Mitt. schweiz. ent. Ges.* **28** (1): 133-5.

Head from above shaped about as in *pretiosa* (Timb.) (Text-fig. 15), but with eyes over-reaching occipital margin; in facial view also similar, but relatively longer (Text-fig. 14, cf. Text-fig. 16): lateral ocelli less than their own diameters from orbital margin. Eyes moderately hairy, distinctly so $\times 65$. Frontovertex much more finely reticulate than in *pretiosa* (Timb.), almost as finely so as in the much smaller *coffeicola* sp. n. but less regularly: sides of face, cheeks and inter-scröbal prominence finely scaly-reticulate.

Antenna (see Ferrière, 1955, fig. 25) decidedly elongate and slender: scape much more so than in *pretiosa* (Timb.), reaching or over-reaching top of head: flagellum not sharply clavate but increasing gradually in width to the club: funicle with first segment quite four times as long as broad, and one and a half times as long as the second, third and fourth segments each shorter but fifth longer than the preceding.

Reticulation on mesoscutum coarser than on frontovertex, much less outstanding and in greater part much finer on scutellum, axillae and mesopleura.

Fore wings weakly infusate beyond speculum ; with prestigma considerably thickened ; with marginal about two and a half times as long as broad ; with speculum not traversing the relatively elongate radius.

Differs from *pretiosa* (Timb.) as follows : green coloration much less extensive, on head reaching neither occiput nor lower level of eyes and on propodeum only on upper part of sides : hind margin of frontovertex, cheeks, remainder of face and pronotum above bronzy like the scutellum : mesopleura and sternum, propodeum in greater part, and sides of gaster pale brown with weak metallic reflections, the gaster above darker and with the reflections stronger. Mandibles stramineous, darker at apices. Antennae pale brown, paler than sides of gaster, and with weak metallic reflections ; having the following stramineous : radicle except at base, scape broadly beneath in about basal half, pedicellus almost wholly, funicle above to about middle of first segment and beneath to about apex of third, though merging gradually to the brown colour. Legs, including hind coxae, mostly stramineous ; having mid and hind femora at extreme apex, fore femora and all tarsi pale testaceous ; having hind coxae at extreme base, third quarter or more of hind femora, and apical segment of all tarsi pale brown, with weak metallic reflections.

Male differs as follows : reticulation on frontovertex finer than in female but sharper and more outstanding : sides of face and inter-srobal prominence finely scaly-reticulate, cheeks very weakly so. Antennae with rami appearing long but actually not relatively so, the fourth ramus not far over-reaching the fifth funicle segment. Reticulation on mesoscutum about as on frontovertex, much weaker and less regular on scutellum, axillae and mesopleura. Fore wings relatively a little broader, with marginal vein markedly shorter and stouter.

Green coloration about as extensive as in female but darker : remainder of body medium to dark brown with more or less weak metallic reflections, only the scutellum and axillae pale bronzy and decidedly shining. Antennae pale brown, with weak metallic reflections ; with scape stramineous in about basal two-thirds, and with pedicellus pale testaceous at apex and beneath. Mid coxae at base, hind coxae wholly, and hind femora except at extreme base brown with metallic reflections : hind tibiae dark marked broadly at apex and before base.

Redescribed from the following material: HUNGARY: Kalocsa, 3 ♂, 30.v.1951, on *Picea excelsa* (J. Erdös) (paratypes). GERMANY: Erlangen, 2 ♀, 3 ♂, 10.v.1950, ex *Phenacoccus piceae* (Loew) (*H. Schmutterer*).

Hungariella spilococci (Ferrière)

1957 *Tetracnemus spilococci* Ferrière, *Opusc. zool., Münch.* **10** : 4-5.

1963 *Hungariella spilococci* (Ferrière) Bachmaier, *Beitr. Ent.* **13** : 560-1.

Head from above strongly emarginate anteriorly and posteriorly ; with eyes not quite reaching occipital margin ; with lateral ocelli about $1\frac{1}{2}$ times their own diameters from orbital margin ; in facial view as described for *pretiosa* (Timb.) but relatively even longer than in *piceae* Erdös. Eyes strongly but not very densely hairy, very distinctly so $\times 45$. Frontovertex much more finely reticulate and shining than in *pretiosa* (Timb.) but distinctly less so than in *piceae* Erdös : sides of face with reticulation as outstanding as it is between ocelli, but cheeks very finely scaly-reticulate.

Antenna more elongate and slender than in *pretiosa* (Timb.), the scape reaching about to level of top of eyes, the first funicle segment three and a half times as long as broad, much longer than any of the following segments.

Reticulation on dorsum of thorax as described for *pretiosa* (Timb.), i.e. on mesoscutum much coarser than on frontovertex of this species : reticulation on mesopleura decidedly finer than on scutellum.

Fore wings moderately infusate beyond speculum ; with prestigma considerably thickened ; with marginal vein about twice as long as broad ; with speculum traversing the apex of the radius, which is emitted at a much acuter angle than in *pretiosa* (Timb.).

Green coloration about as extensive as in *piceae* Erdös : hind margin of frontovertex, remainder of face, and pronotum purplish bronzy like the scutellum : cheeks and remainder of body

brownish black, with strong metallic reflections on cheeks, gaster and sides of pronotum. Antennae blackish brown, with weak metallic reflections; pale testaceous on scape at extreme base, and on pedicellus at apex and beneath.

Legs mainly stramineous: fore and mid coxae at base, hind coxae and femora almost totally, and tarsal apices brown with metallic reflections: fore and mid coxae in greater part and femora broadly at base, and all trochanters stramineous.

Male differs as follows: reticulation on frontovertex and sides of face as in female, but not nearly so fine on cheeks. Antennae with fourth ramus distinctly a little over-reaching the fifth funicle segment. Sculpture on thorax about as in female. Fore wings relatively only a little broader than in female.

Frontovertex, except for the purplish bronzy hind margin, and mesoscutum green to blue-green with weak brassy reflections: face and cheeks very dull green to steel-blue, with similar reflections: axillae and scutellum coloured about as in *peregrina* (Comp.): occiput, pronotum, mesopleura, propodeum and gaster brownish black, with metallic reflections. Antennae pale brown with weak metallic reflections, having scape almost stramineous at extreme base. Leg colour about as described for female.

Redescribed from the holotype ♀ and 3 ♂ reared from *Spilococcus nanae* Schmutterer in southern Bavaria by F. Bachmaier (see Ferrière, 1957).

Hungariella mediterranea sp. n.

(Text-figs. 13, 22)

Head from above (Text-fig. 13) relatively broad, less deeply emarginate than in *pretiosa* (Timb.) both anteriorly and posteriorly; with eyes not quite reaching occipital margin; in facial view similar: lateral ocelli about their own diameters from orbital margin. Eyes strongly and rather densely hairy, very distinctly so $\times 45$. Reticulation of frontovertex a little finer and less outstanding than in *pretiosa* (Timb.): sides of face, cheeks and inter-scoral prominence more finely scaly-reticulate.

Antenna similar in proportion to that of *pretiosa* (Timb.), notably the first funicle segment $2\frac{1}{2}$ to nearly 3 times as long as broad.

Reticulation on mesoscutum about as on frontovertex, much less outstanding and usually much finer on scutellum, axillae and mesopleura.

Fore wings much as described for *pretiosa* (Timb.), but relatively much broader, quite strongly infusate beyond and before the speculum, the prestigma rather less thickened and bearing stronger hairs, the marginal rather longer, and the radius having a long, sharp uncus (Text-fig. 22).

Head and pronotum blue-green to blue and reddish violet, with brassy reflections on frontovertex: mesoscutum and propodeum brassy green or, in smaller specimens, more blue-green, the mesoscutum usually with peripheral violet reflections, the propodeum more indefinitely metallic coloured in middle: scutellum and mesopleura reddish violet, or the scutellum more bronzy: gaster about as head, but the colours less pronounced, having the first large tergite mainly blue-green. Antennal coloration as described for *pretiosa* (Timb.), but scape more broadly pale on inner side.

Legs having hind coxae as sides of gaster; otherwise mainly yellow-stramineous, the tarsi, tibiae, hind femora above and mid coxae at extreme base darker.

Male differs as follows: reticulation on frontovertex and mesoscutum rather finer than in female, on sides of face and inter-scoral prominence about as on frontovertex, on cheeks, scutellum, axillae and mesopleura about as in female. Antennae with fourth ramus very distinctly over-reaching the fifth funicle segment. Fore wings about as in female.

Frontovertex, pronotum and mesoscutum a very dark green with metallic reflections: cheeks, lower parts of face and sides of propodeum mostly a much brighter blue-green: scutellum bronzy, mesopleura and often axillae blue and reddish violet: gaster, middle and sides of propodeum blackish brown with metallic reflections. Antennal colour as described for *pretiosa* (Timb.) male. Legs much as described for female, but the hind femora and tibiae dark, except at base and above.

Holotype ♀. FRANCE: Antibes, 1956, ex *Pseudococcus* sp. on *Choisya* (Benassy).
Paratypes. FRANCE: 4 ♀, 4 ♂ (same data as holotype), 1 ♀, 4 ♂, 1956, ex *Pseudococcus* sp. on *Pittosporum* (Benassy).

Holotype and paratypes in Muséum d'Histoire Naturelle, Geneva, paratypes in British Museum (Natural History).

***Hungariella brounii* (Howard Ms.) (Timberlake), comb. n.**

(Text-fig. 23)

1929 *Tetracnemus brounii* Timberlake, *Univ. Calif. Publs Ent.* 5 (2) : 6.

1939 *Tetracnemus brounii* Timberlake; Compere, *Ibidem*, 7 (4) : 60.

Head from above rather strongly but narrowly emarginate anteriorly, about as deeply so behind as in *mediterranea* sp. n.; relatively less broad than in *pretiosa* (Timb.); with eyes not quite reaching occipital margin; in facial view similar to *pretiosa* (Timb.) but relatively somewhat longer: ocelli relatively small, the lateral ones twice their own diameters from orbital margin. Eyes moderately hairy, just distinctly so $\times 65$. Reticulation on frontovertex more strongly outstanding than in *pretiosa* (Timb.), about as in *peregrina* (Comp.), and on sides of face equally strong: inter-scribal prominence more weakly reticulate, and cheeks very finely scaly-reticulate.

Antenna with scape and pedicellus about as in *pretiosa* (Timb.); with first funicle segment cylindrical, about $2\frac{1}{2}$ times as long as broad; with remainder of funicle broadening markedly to the club, with second to fourth funicle segments each about three-fifths the length of the first, the fifth distinctly longer (the fourth and fifth subequal in *pretiosa*).

Reticulation on scutellum and axillae less outstanding than on frontovertex but coarser, on mesoscutum as outstanding as on head and still coarser, on mesopleura much weaker and finer.

Fore wings (Text-fig. 23) clear, not infusate, relatively narrower than in *pretiosa* (Timb.); with prestigma considerably thickened; with marginal vein nearly twice as long as broad; with speculum not traversing the radius, which is emitted at about the same angle as in *pretiosa* (Timb.).

Head in greater part and mesoscutum colour about as described for *peregrina* (Comp.), but the head often in part virescent: axillae dull bronzy; scutellum pale brassy green: mesopleura pale brown, with very weak metallic reflections: propodeum pale brown, with metallic reflections rather weak even on sides: gaster usually much darker, with greenish, purplish and brighter reflections. Antennal coloration as described for *pretiosa* (Timb.) but paler, the scape pale stramineous in about basal half to two-thirds.

Legs whitish stramineous: hind coxae pale brown like the mesopleura but darker: tarsi, tibiae, and often mid coxae at base slightly tinged with the same, the tarsi dark at apex.

Male differs as follows: reticulation on frontovertex decidedly finer than in female and on sides of face still finer. Antennae with fourth ramus distinctly over-reaching fifth funicle segment. Sculpture of mesonotal sclerites and mesopleura about as in female. Fore wings relatively a little broader than in female.

Altogether duller coloured than female: head mostly a dull blue-green, with infusions of bronzy: mesoscutum the same, or mostly overspread with bronzy: scutellum a relatively bright bronzy, axillae duller: mesopleura and propodeum rather duller than in female, but gaster about the same. Antennae pale brown, with weak metallic reflections; with scape pale stramineous in about basal half to two-thirds. Legs stramineous, the following pale brown with weak metallic reflections: hind coxae, mid coxae weakly at base, hind femora except at base and apex, hind tibiae except at base, and all tarsi: mid femora and tibiae just weakly darkened above.

Redescribed from the following material: NEW ZEALAND: Nelson, 6 ♀, 5 ♂, 19.iii.1927, ex *Pseudococcus* sp. (E. S. Gourlay). These specimens are part of the

material which was reared by Mr. Gourlay from mealybug on the "black passion-fruit vine", as he has informed me by letter. Material is to be deposited in the British Museum (Natural History), and in the Cawthron Institute and the Department of Entomology, Nelson, N.Z.

The holotype ♀ and allotype are in the U.S. National Museum, but the paratypes, i.e. the remaining specimens seen by Mr. Timberlake, cannot be traced either as having been retained by him at Riverside or as having been received back by Mr. Gourlay.

Hungariella peregrina (Compere)

1939 *Tetracnemus peregrinus* Compere, *Univ. Calif. Publs Ent.* 7 (4) : 59-61.

Head from above about same shape as *pretiosa* (Timb.) (Text-fig. 15), but with eyes just over-reaching occipital margin; in side view more strongly narrowed to mouth than in *pretiosa* (Timb.); in facial view with cheeks more rounded than in *pretiosa* (Timb.): lateral ocelli slightly less than their own diameters from orbital margin. Eyes strongly and densely hairy, very distinctly so $\times 45$. Reticulation on head more strongly outstanding than in *pretiosa* (Timb.).

Antenna as described and figured by Compere (1939), notably the scape much less elongate than in *pretiosa* (Timb.) and the first funicle segment hardly longer than broad, shorter than any of the four following segments.

Reticulation on mesoscutum and also scutellum finer than in *pretiosa* (Timb.): mesopleura much more weakly reticulate than scutellum. Fore wings rather weakly infusate beyond and before speculum; with prestigma scarcely thicker than first abscissa of submarginal; with marginal not nearly twice as long as broad; with speculum not traversing the radius, which is emitted at a much acuter angle than in *pretiosa* (Timb.).

Differs from *pretiosa* (Timb.) as follows: head, mesoscutum and propodeum a duller, decidedly blue-green with reflections less pronounced: axillae and scutellum duller, something between brassy and bronzy, the scutellum distinctly green at sides: mesopleura pale brown, with weak metallic reflections.

Antennal coloration as described for *pretiosa* (Timb.), but scape often much more broadly pale.

Legs mainly a paler stramineous than in *pretiosa* (Timb.), the hind coxae beneath often also of this colour: hind femora, except broadly at base and narrowly at apex and beneath, usually brown with metallic reflections, and fore femora in part occasionally so (Moroccan specimen).

Male differs as follows: reticulation on head, mesoscutum, scutellum and mesopleura about as in female. Antennae with fourth ramus very distinctly over-reaching fifth funicle segment. Fore wings relatively distinctly broader; with postmarginal very reduced.

Green coloration much less prominent than in female, usually obvious on sides of face, but often indistinct on frontovertex and mesoscutum. Antennal colour as described for *pretiosa* (Timb.) male. Leg colour much as described for the male of *pretiosa* (Timb.) but the stramineous coloration paler, and the hind femora not markedly pale beneath.

Redescribed from the following material: BRAZIL: Rio de Janeiro, 1 ♀, 3 ♂, 10.ix.1934, ex *Pseudococcus longispinus* (Targ.), (*H. Compere*) (paratypes). U.S.A.: California, San Diego, Balboa Park, 1 ♀, 3.i.1940, ex *Ps. longispinus* (Targ.) on *Dracaena* (*S. E. Flanders*); Fontana, 5 ♀, 1 ♂, 1953, ex *Ps. longispinus* (Targ.), Commonwealth Inst. of Biological Control. SOUTH AFRICA: Cape Town, 2 ♀, 2 ♂, 24.vii-13.viii.1924, ex "black scale" (*E. W. Rust*) (reared at Riverside); Elsenburg, 3 ♀, 2 ♂, 1926, ex mealybug on pear (*F. W. Petty*); Camps Bay, 2 ♀, 1 ♂, ex Coccid on Oleander (*H. Compere*); Malmesbury, 17 ♂, 7.i.1937, ex *Pseudococcus fragilis* Brain (*H. Compere*); Natal, Durban, 1 ♂, viii.1947, ex mealybug material (*H. Compere*);

Transvaal, Pretoria, 1 ♀, 1 ♂, xi.1954, ex scale infested plant material (*E. G. C. Bedford*). ST. HELENA: Thomson's Wood, 1 ♀, 29.vii.1959, "on gumwood" (*C. R. Wallace*). MOROCCO: 1 ♀, 5.vi.1953, "ex B 518", "Vanden Bosch Skipper". FRANCE: Menton, 1 ♀, 2 ♂, iv.1952, ex *Ps. longispinus* (Targ.) on *Chamaerops humilis* (L.) (Palmae), 1 ♀, 3 ♂, vi.1952, ex *Ps. longispinus* (Targ.) on *Pittosporum tobira* Ait. (*J. Ghesquière*). Material in Citrus Experiment Station, Riverside, in Department of Agriculture, Pretoria, in collection of Monsieur J. Ghesquière, in Národní Museum, Prague, and in British Museum (Natural History).

Hungariella coffeicola sp. n.

(Text-figs. 17-18, 24)

Head from above (Text-fig. 17) much longer than in *pretiosa* (Timb.); strongly emarginate anteriorly and rather strongly so posteriorly; with eyes distinctly over-reaching occipital margin; in facial view (Text-fig. 18) with cheeks more rounded than in *pretiosa* (Timb.); lateral ocelli about their own diameters from orbital margin. Eyes weakly hairy ($\times 100$). Frontovertex much more finely reticulate than in *pretiosa* (Timb.): sides of face, cheeks and interscrobal prominence very finely scaly-reticulate.

Antenna with scape about as in *peregrina* (Comp.), with first funicle segment not quite twice as long as broad, longer than any of the four following, which are more strongly expanded from base to apex than in *pretiosa* and *peregrina*.

Reticulation on mesoscutum and scutellum about as on frontovertex; that on mesopleura decidedly finer but still sharp and outstanding.

Fore wings (Text-fig. 24) moderately infusate before speculum; with prestigma considerably thickened, bearing three hairs that are about as strong as those on first abscissa of submarginal; with marginal less than twice as long as broad, bearing two hairs that also are especially conspicuous; with radius short and stout, having a distinct but not sharp uncus.

Colour of head, thorax, propodeum and gaster as described for *pretiosa* (Timb.). Antennal coloration as described for *peregrina* (Comp.). Legs having the following coloured as sides of gaster but paler: hind coxae except at extreme apex, mid coxae in about basal three-fifths, and hind femora except at base and apex: otherwise mainly pale stramineous, the fore and mid femora at apex, tibiae and tarsi tending to rufo-testaceous, the mid and hind tarsi infusate at apex: sometimes having fore and mid femora and hind tibiae weakly infusate in part.

Male differs as follows: reticulation on frontovertex slightly coarser than in female but much sharper and more outstanding; on sides of face about the same as on frontovertex but on cheeks much finer. Antennae with fourth ramus not so distinctly over-reaching fifth funicle segment as in *peregrina* (Comp.). Reticulation on thorax about as in female. Fore wings relatively a little broader than in female.

Differs from female as follows: frontovertex and mesoscutum a duller brassy green or blue-green with more bronzy reflections; face and cheeks almost blue; scutellum a duller bronzy: in contrast with *pretiosa* (Timb.) the scrobal impression is bright bronzy as in the female. Antennae pale brown, with weak metallic reflections: scape sometimes wholly flavo-testaceous, but more often in large part darkened. Leg colour much as described for female, but the hind tibiae and tarsi often more strongly and extensively infusate.

Holotype ♀. UGANDA: Bukalasa, 20.iii.1938, ex *Planococcus kenyae* (Le Pelley) on *Coffea robusta* (*A. R. Melville*).

Paratypes. UGANDA: 5 ♀, 4 ♂ (same data as holotype), 8 ♀, same data but 2.v.1928; Entebbe, 1 ♀, 16.iii.1938, Mbarara, 1 ♀, vi.1938, Toro, 10 ♀, 4 ♂, 2.viii.1928, ex *Pl. kenyae* on *C. robusta* (*A. R. Melville*); Kimiriri, 2 ♀, 4 ♂, ix.1953, ex *Pseudococcus* sp. (*A. A. Talbot*). KENYA: Nairobi, National Agricultural Laboratory, 5 ♀, 4 ♂, 1938, propagated on *Pl. kenyae* (*R. Le Pelley*).

Holotype in British Museum (Natural History); paratypes in British Museum (Natural History), in U.S. National Museum, in Citrus Experiment Station, Riverside, in Australian National Collection, in Museum d'Histoire Naturelle, Geneva, in Národní Museum, Prague, in Coryndon Museum, Nairobi, and in Department of Agriculture, Pretoria.

Additional material studied. UGANDA: Kangundo, 5 ♂, vi.1955, *ex Planococcus citri* (Risso) on *Coffea arabica* (D. J. McCrae). Mr. McCrae wrote in a letter dated 28th January, 1958 that the form reared from *P. citri* would attack *P. kenyae* but that no progeny were reared. No female specimen of this rearing was received in London; the males do not appear to me to differ significantly from specimens reared from *P. kenyae*, in particular, the marginal vein bears the two conspicuous hairs.

***Hungariella indica* (Ramakrishna Ayyar), comb. n.**

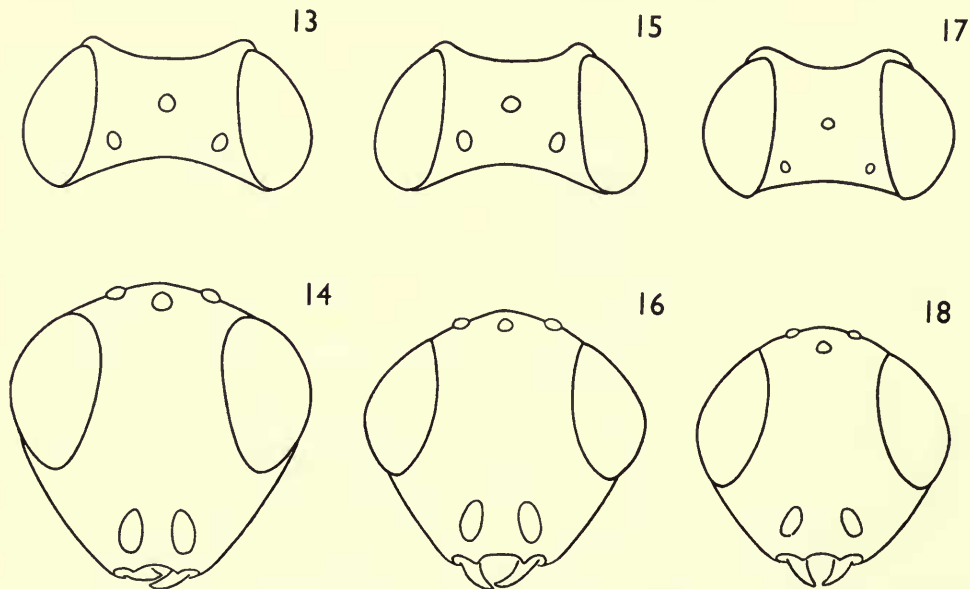
(Text-figs. 19–20)

1929 *Tetracnemus indicus* Ramakrishna Ayyar, *Rec. Indian Mus.* 34: 287–8.

Head collapsed in all specimens available for study, but apparently shaped about as in *coffeicola* sp. n. (Text-figs. 17–18). Lateral ocelli about their own diameters from orbital margin. Eyes weakly hairy ($\times 100$). Frontovertex reticulate about as in *pretiosa* but a little finer: sides of face and inter-scorbal prominence not much more finely sculptured than frontovertex.

Antenna with scape and first four funicle segments about as in *coffeicola* sp. n., the fifth funicle very much larger, more resembling a club segment (Text-fig. 20).

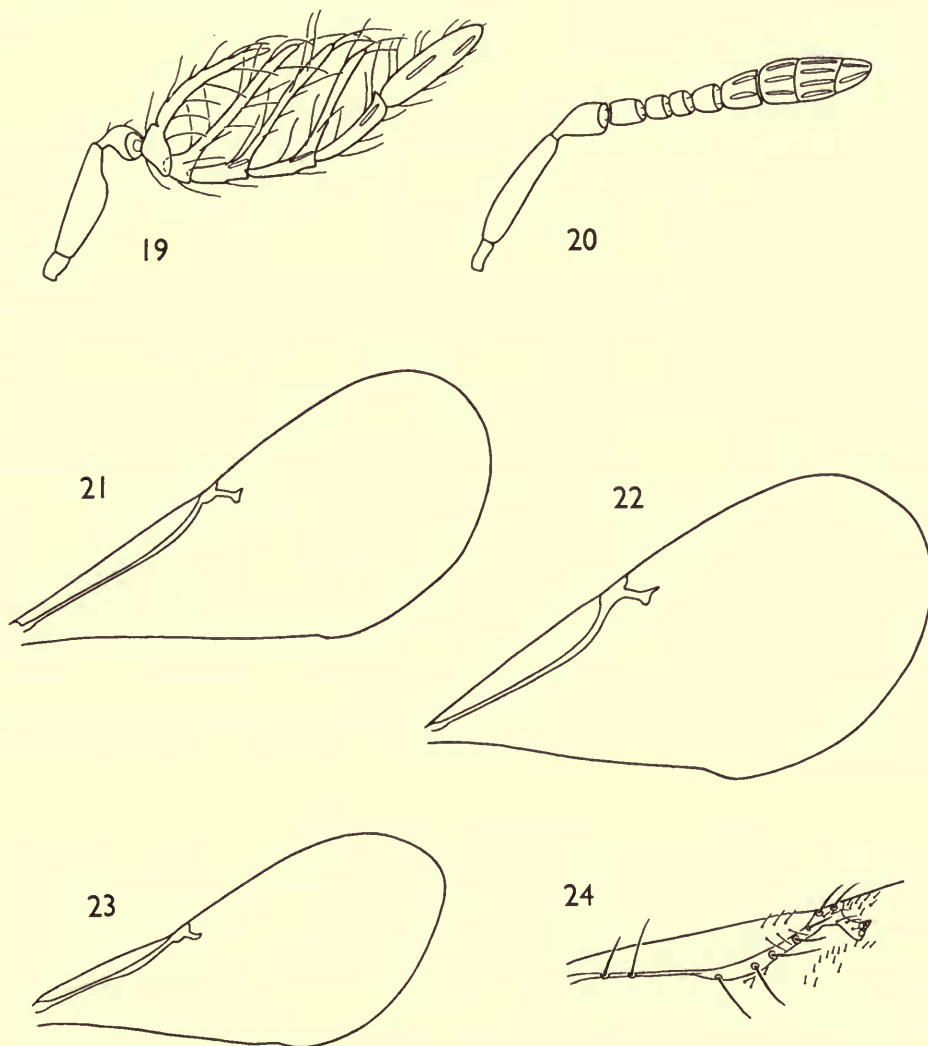
Reticulation of mesoscutum, scutellum and mesopleura about as coarse as on frontovertex but much less outstanding, the surfaces more shining.



FIGS. 13–18. *Hungariella* species, females. 13, *H. mediterranea* sp. n., head, seen from above; 14, *H. piceae* Erdős, head in facial view; 15, *H. pretiosa* (Timb.), head, seen from above; 16, the same in facial view; 17, *H. coffeicola* sp. n., head, seen from above; 18, the same, in facial view.

Fore wings rather weakly infusate beyond and before speculum; with prestigma not much thickened; with marginal about twice as long as broad; with radius emitted about as in *peregrina* (Comp.).

Head for the most part, mesoscutum, scutellum, propodeum and first large tergite a rather bright brassy green: occiput, pronotum, mesopleura, sternal regions and most of gaster pale brown, with weak metallic reflections: antennae having scape wholly stramineous; having pedicellus and flagellum pale brown, with multicoloured metallic reflections. Legs with hind coxae above coloured as mesopleura but paler: otherwise pale testaceous to dull stramineous, the segments tending to rufous at their apices.



FIGS. 19-24. *Hungariella* species. 19-20. *H. indica* (Ram. Ayyar), right antenna, in dextro-lateral view, of 19, male and 20, female. 21-23. Right fore wing of female of 21, *H. pretiosa* (Timb.); 22, *H. mediterranea* sp. n.; 23, *H. brounii* (Timb.). 24, Part of right fore wing of female, on larger scale, of *H. coffeicola* sp. n.

Male differs as follows: reticulation on frontovertex, sides of face and inter-scrobal prominence about as in female. Antennae with fourth ramus very distinctly over-reaching the fifth funicle segment. Sculpture of thorax as described for female, but the surfaces not so shining. Fore wings relatively markedly broader, and with marginal vein stouter.

Not much green coloration on first large tergite, and scutellum mainly bronzy: green parts otherwise as in female, the green, however, much darker, but less dark than in male *pretiosa* (Timb.). Antennal colour as described for female. Leg colour much as described for female, but the hind femora at apex and hind tarsi more darkened.

Redescribed from the following: INDIA: Madras, Coimbatore, 3 ♂, viii.1924, on *Planococcus citri* (Risso), (T.V. Ramakrishna Ayyar) (holotype and paratypes); Coimbatore, 5 ♀, 3 ♂, 25.viii.1937, ex *Planococcus* sp. ?*lilacinus* (Ckll.) (R.H. Le Pelley).

Through the kindness of Dr. S. Pradhan I have been able to examine the type of *Tetracnemus indicus* Ramakrishna Ayyar from the Zoological Survey of India, Calcutta, and I am satisfied that it is the same as the species later reared at Coimbatore by R. H. Le Pelley. There are certain obscurities in the original description. The type is mounted on a slide with the head detached. The artist has evidently drawn the text-figure from the facial view but has so altered the focus of the microscope that the base of the antennal scape is not shown as being above the lower face and genae. The author has described the scape as projecting far beyond the anterior margin of the head, which evidently applies to the same view in which these structures are seen: the scape at rest does not reach the top of the head, in fact the length of scape and radicle is decidedly less than the distance from the base of the radicle to the median ocellus, as is shown accurately in the figure. The petiole of the first funicle segment does appear, in the slide mount, to consist of two rings.

Two other male specimens, mounted on slides and labelled in the same handwriting with the same data were among material on loan from Dr. Compere. These were probably among material given to him when he visited Dr. Ramakrishna Ayyar at Coimbatore on 28th June, 1932, and are evidently the two paratypes. Compere has generously agreed that they may be deposited in the British Museum (Natural History) and the U.S. National Museum respectively.

Further material in Zoological Survey of India, Calcutta, at Citrus Experiment Station, Riverside, and in British Museum (Natural History).

KEY TO SPECIES OF *HUNGARIELLA* Erdős: FEMALES

- 1 Of more slender and elongate build than its known congeners, with gaster about equal to combined length of head, thorax and propodeum: antennae decidedly elongate and slender, with scape reaching top of head, with flagellum not sharply clavate, and with first funicle segment quite four times as long as broad: pedicellus almost wholly stramineous and flagellum conspicuously so at base: Europe . . . *piceae* Erdős
- Less slenderly built, with gaster much less than combined length of head, thorax and propodeum: antennae much stouter, with scape not reaching top of head, with flagellum more or less sharply clavate, and with first funicle segment plainly less than four times as long as broad: pedicellus only stramineous at apex and beneath, and funicle not pale at base 2
- 2 First funicle segment $2\frac{1}{2}$ to $3\frac{1}{2}$ times as long as broad [a compact group of species separable also on individual characters from those in alternate] 3
- First funicle segment plainly less than twice as long as broad 6

- 3 First funicle segment $3\frac{1}{2}$ times as long as broad: head, in facial view, even longer than in *piceae* Erdös (Text-fig. 14): hind femora almost wholly brown: Europe
spilococci (Ferrière)
- First funicle segment about $2\frac{1}{2}$ times as long as broad: head, in facial view, much less elongate (e.g. Text-fig. 16): hind femora mostly yellow-stramineous 4
- 4 Antennal funicle strongly expanded towards the club, the fifth segment distinctly longer as well as broader than the fourth and thus appearing transitional: ocelli relatively small, the lateral ones twice their own diameters from orbital margin: fore wings hyaline, relatively narrow (Text-fig. 23): scutellum pale brassy green: mesopleura pale brown, with very weak metallic reflections: New Zealand
brounii (Howard MS.) (Timberlake)
- Antennal funicle slightly expanded towards the club, the fifth segment subequal in length to the fourth and not appearing transitional: lateral ocelli about their own diameters from orbital margin: fore wings at least moderately infusate, broader: scutellum and mesopleura more or less bronzy or reddish violet, the metallic colour on the mesopleura strong 5
- 5 Head from above (Text-fig. 15): eyes moderately hairy, distinctly so $\times 65$: fore wings moderately broad, with uncus normal (Text-fig. 21): distribution widespread *pretiosa* (Timberlake)
- Head from above (Text-fig. 13) relatively broad and less deeply emarginate: eyes strongly and rather densely hairy, very distinctly so $\times 45$: fore wings still broader, the radius having a long, sharp uncus (Text-fig. 22): Mediterranean area
mediterranea sp. n.
- 6 First funicle segment hardly longer than broad, shorter than any of the following (see Compere, 1939, fig. 2): head about same shape as in *pretiosa* Timb. (Text-fig. 15): eyes strongly and densely hairy, very distinctly so $\times 45$: frontovertex and mesoscutum blue-green, duller: distribution widespread *peregrina* (Compere)
- First funicle segment nearly twice as long as broad, longer than any of the three following: head from above much longer (e.g. Text-fig. 17): eyes weakly hairy ($\times 100$): frontovertex and mesoscutum medium green to bright brassy green 7
- 7 Fifth funicle segment about as long as the first and much larger than any of the preceding, more like a club segment (Text-fig. 20): marginal vein not bearing two very conspicuous hairs: scape wholly stramineous: hind femora pale testaceous, rufous towards apex: southern India *indica* (Ramakrishna Ayyar)
- Fifth funicle segment decidedly shorter than first and not much larger than fourth: marginal vein bearing two very conspicuous hairs (Text-fig. 24): scape pale brown on about apical half: hind femora, except at base and apex, brownish black with metallic reflections: East Africa *coffeicola* sp. n.

KEY TO SPECIES OF *HUNGARIELLA* Erdös: MALES

- 1 Antennae with fourth ramus hardly or only a little over-reaching the fifth funicle segment: species known from northern and middle Europe 2
- Antennae with fourth ramus very distinctly over-reaching the fifth funicle segment: Mediterranean region and extra-European 3
- 2 Antennal scape pale in about basal two-thirds: eyes less strongly hairy (see description) *piceae* Erdös
- Antennal scape pale at extreme base only: eyes more strongly hairy *spilococci* (Ferrière)
- 3 Antennal scape pale at extreme base only: radius more slender, and emitted at an acuter angle cf. *spilococci* (Ferrière)
- Antennal scape flavo-testaceous in about basal two-thirds: radius stouter, and emitted at a less acute angle 4
- 4 Antennal club about one-fifth longer than scape without radicle: eyes distinctly hairy $\times 65$ *pretiosa* (Timberlake)

- Antennal club about equal in length to scape without radicle 5
- 5 Ocelli relatively small, the lateral ones twice their own diameters from orbital margin: fore wings relatively narrow, though less narrow than in female of same species: eyes moderately hairy, just distinctly so $\times 65$: mesopleura rather pale, with weak metallic reflections: New Zealand *brounii* (Howard MS.) (Timberlake)
- Ocelli relatively larger, the lateral ones about or even less than their own diameters from orbital margin: fore wings relatively broader: eyes decidedly either more strongly or more weakly hairy: mesopleura darker 6
- 6 Eyes strongly hairy, very distinctly so $\times 45$: larger species 7
- Eyes weakly hairy ($\times 100$): smaller species 8
- 7 Reticulation of frontovertex finer, less regular and outstanding: eyes less densely hairy: fore wings with prestigma markedly thickened, and with radius having a long, sharp uncus: antennal scape and club relatively longer: scrobal impressions bright blue-green: mesopleura blue and reddish violet: Mediterranean area *mediterranea* sp. n.
- Reticulation of frontovertex coarser, more regular and outstanding: eyes decidedly more densely hairy than in any other known species: fore wings with prestigma scarcely thicker than first abscissa of submarginal, and with uncus of radius normal: antennal scape and club relatively shorter: scrobal impressions bronzy: distribution widespread including Mediterranean area *peregrina* (Compere)
- 8 Fore wings with marginal vein nearly twice as long as broad, not bearing two especially conspicuous hairs: scrobal impressions green: hind femora dull stramineous, weakly infusate in about apical third *indica* (Ramakrishna Ayyar)
- Fore wings with marginal vein not nearly twice as long as broad, bearing two very conspicuous hairs (see Text-fig. 24): scrobal impressions bronzy: hind femora, except at base and apex, brownish black with metallic reflections *coffeicola* sp. n.

ERICYDNUS Walker, 1837

- 1837 *Ericydnus* (Haliday MS.) Walker, *Ent. Mag.* **4**: 363.
- 1875 *Ericydnus* Walker; Thomson, *Hymenoptera Scandinaviae* **4**: 123-4.
- 1876 *Ericydnus* Walker; Mayr, *Verh. zool.-bot. Ges. Wien* **25**: 762-3.
- 1909 *Ericydnus* Walker; Schmiedeknecht, *Genera Insectorum* **97**: 195-8, 203.
- 1921 *Ericydnus* Walker; Mercet, *Trab. Mus. nac. Cienc. nat., Madr.*: 60-1, 73-5, 158-9.
- 1952 *Ericydnus* Walker; Nikol'skaya, *Opred. Faune SSSR* **44**: 324-6, 356.
- 1953 *Ericydnus* Walker; Ferrière, *Mitt. schweiz. ent. Ges.* **26**: 6-20.
- 1964 *Ericydnus* Walker; Peck, Bouček & Hoffer, *Mem. ent. Soc. Canada* **34**: 64-77.

Elongate, slender Encyrtidae, with antennae and legs of female decidedly elongate: moderately strongly sclerotized, so that in death the head is not especially liable to collapse or distortion as it is in some allied genera.

Head from above reniform (Text-figs. 25-26), in this view not or but little emarginate anteriorly on account of the scrobal impression, rather strongly to strongly emarginate posteriorly: eyes rather sparsely but always distinctly pubescent, generally distinctly so $\times 25$, nearly but never quite reaching the posterior margin, which is sharp and distinctly raised: frontovertex broader than an eye, bearing punctures of no more than moderate depth, that commonly are separated by about their own diameters: lateral ocelli close to eyes: toruli obovate, separated from mouth by less than their own length: common scrobal impression extending less than half way up orbits. Mandibles greatly narrowed from base, bidentate, with upper tooth the longer. Antennae of female not strongly clavate: scape elongate, not dilated: funicle 6-segmented, the segments increasing gradually in breadth: club 3-segmented, the first segment a little broader than the sixth funicle. Thorax rather flattened above, not deep dorsoventrally: axillae contiguous, with a short longitudinal suture between them¹: scutellum elongate except in very short-winged forms, having a weak to strong laminate apical margin (Text-figs. 27-29).

¹ In very short-winged specimens the axillae may appear separate owing to the hind margin of the mesoscutum, when bent back, overlying the common suture.

Propodeum with a pair of transverse keels, weakly or strongly developed, which bend round at sides to near apices of the longitudinal keels which run back from the inner side of the spiracles. Fore wings (Text-figs. 30–34) of normal breadth to narrow : marginal vein several times as long as broad, and postmarginal at least about as long as marginal, usually considerably longer : brachypterous forms frequent.

The species of this genus have been very much confused. Thanks, to a large extent, to the loan of really extensive material by Drs. Z. Bouček and A. Hoffer, it has proved possible to achieve a satisfactory separation of the macropterous forms: in Europe there are here recognized six species, of which one may be a mutant form. The micropterous forms are more difficult to separate since they are, to a greater or lesser extent, more weakly characterized: the head shape, proportions of antennal segments, and the propodeum are particularly affected.

Precise data of the Czechoslovak specimens are not included here, partly because the material is so extensive, and partly because I understand it to be the intention of Dr. Hoffer to make a more intensive study of the fauna of his own country in due course.

Ericydnus ventralis (Dalman)

(Text-figs. 25, 30)

- 1820 *Encyrtus longicornis* var. *ventralis* Dalman, *K. svenska Vetensk-Akad. Handl.* **41** : 166.
 1837 *Ericydnus paludatus* (Haliday MS.) Walker, *Ent. Mag.* **4** : 363–4.
 1876 *Ericydnus ventralis* Dalman ; Mayr, *Verh. zool.-bot. Ges. Wien* **25** : 763–5 (*non* var. *biplagiatus*).
 1921 *Ericydnus dichrous* Mercet (♀ *non* ♂), *Trab. Mus. nac. Cienc. nat., Madr.* : 159, 164–7.
 1957 *Ericydnus dichrous* Mercet ; Erdős, *Acta zool. hung.* **3** : 21–3.
 1966 *Ericydnus ventralis* Dalman ; Kerrich, *Opusc. ent.* **31** : 119.

Head, seen from above (Text-fig. 25) narrow and rather elongate, very weakly rounded or broadly emarginate in front, having occiput extending back so that it is clearly visible behind the occipital margin from above, in facial view with cheeks well rounded. Frontovortex very finely reticulate ; with piliferous punctures of less than moderate size, nearly all separated by more than their own diameters, and the orbitals not very small, separated by about their own diameters : face and cheeks very finely scaly-reticulate. Eyes rather densely hairy.

Antenna with scape nearly reaching the median ocellus ; with pedicellus about twice as long as broad and a little shorter than the first funicle segment : funicle broadening rather gradually, having first segment about twice as long as broad and a little shorter than the second or third, with the following decreasing in length gradually : club about equal to combined length of segments four and five.

Pronotum, mesoscutum, axillae and scutellum very finely and weakly reticulate and densely beset with weak piliferous punctures that are separated, some by more but many by less than their own diameters. Scutellum sharply margined, very weakly laminate at apex, little raised above metathorax. Mesopleura behind scaly-reticulate about as on cheeks, in front very finely alutaceous. Propodeum on sides with reticulation about as on scutellum ; having a partly reticulate median area bordered by or containing fine longitudinal keels, often a median keel, and distinctly raised at mid base ; elsewhere very finely alutaceous and shining, with transverse keels rather weak.

Wings relatively narrow, as in Text-fig. 30 or even considerably narrower, with postmarginal vein extending relatively far beyond uncus. In this species only slight wing reduction is known, and this condition is scarce.

Male antenna with scape reaching a little beyond the median ocellus ; with pedicellus relatively shorter than in female, much shorter than the first funicle segment ; with flagellum

almost filiform : first funicle segment about twice as long as broad, second a little longer than first and third a little longer than second, the remainder about equal : club less than the combined length of the two preceding segments.

Frontovertex normally in greater part and inter-scorbal prominence red-violet, though frontovertex broadly blue-green along hind margin and sometimes more extensively : scrobes, temples and cheeks bronzy with bright reflection. Pronotum almost entirely dull blue-green. Mesoscutum, axillae, scutellum and propodeum varying from almost entirely dull blue-green, usually with a little testaceous colouring just above the tegulae, to (in a Spanish and, more curiously, a Norwegian specimen) chrome-yellow, with little dark colouring except on upper surface of propodeum : light red-violet reflection is widespread. Post-spiracular sclerite and mesopleura varying from undarkened chrome-yellow (in a Spanish specimen) to dull testaceous, the mesopleura almost wholly darkened. Gaster varying from bright testaceous, moderately darkened in middle above (Spanish specimen) to dull testaceous, mostly darkened. Antennae brownish black, with weak metallic reflections ; having scape often beneath and sometimes almost wholly, pedicellus at apex and beneath, and sometimes basal segments of funicle, more or less pale brown. Legs yellow-testaceous, with the following darkened : tarsal apices, hind femora, at least in part, and tibiae and tarsi above, and often, especially in male, the fore and mid femora and tibiae in part.

Dalman described this species, recording it as having been taken by Boheman in the Swedish province of Småland.

Six specimens stand in the Boheman collection as *ventralis* Dalman: all were taken by Boheman in Småland with the exception of the fourth, which was captured in the Stockholm area, and the second, which seems to be a Zetterstedt specimen.

I designate the third specimen in the series as LECTOTYPE: this specimen is also considered by Dr. M. de V. Graham to agree best with the original description. All specimens in the series, except the first, which is now determined as *sipylus* Walk., belong to this species.

The first, second, third and fifth specimens in the series are marked as having been seen by Thomson. In the Thomson collection there are specimens of this species standing in the series named as both *longicornis* and *ventralis*.

I have studied the type of *paludatus* Walker, which is in the Haliday collection and is a male from Portmarnock with very slightly reduced wings.

I believe Mayr's diagnosis (1876) to refer to this species.

I have not seen the female holotype of *dichrous* Mercet but feel confident of the identity of the insect described. The male from the same locality, associated by Mercet and illustrated by Professor Ceballos in his work, I have been able to study: I have not been able to identify this micropterous specimen with confidence, but place it provisionally as a form of the species now determined as *strigosus* Nees. The lamina at apex of the scutellum is more strongly developed than in any macroppterous male specimen of *ventralis* Dalm. that I have been able to study.

Material studied. IRELAND: Co. Down, Portmarnock, 1 ♂, type of *paludatus* (Haliday ms.) Walker. ENGLAND: unlocalized, 2 ♀, 2 ♂, Dale coll.; Oxon., Lewknor, 2 ♀, 2.vi.1957, Otmoor, 2 ♂, 5.vi.1958, Bald Hill, 1 ♀, 3 ♂, vi.1957, Berks., Bagley Wood, 1 ♀, 31.vii.1954, Wytham Wood, 1 ♂, 17.viii.1952, 1 ♂, 5.vi.1958, 2 ♀, 8.vii.1959 (*M. de V. Graham* or *M. F. Claridge*); Berks., Silwood Park, 1 ♀, 22.v.1950, on grass (*O. W. Richards*); Cambridge, 1 ♀, Hope-Westwood coll. NORWAY: Jaeren Orre, 1 ♀, 11.vii.1953, (*Ardö*). SWEDEN: Skåne, Småland and Stockholm district, 11 specimens including lectotype, Dalman and Thomson colls.; Närke,

Örebro district, 1 ex., 2I.v-4.vii (*A. Jansson*). SPAIN: Fuenterrabia, 1 ♀, 14.viii. 1919 (*G. Mercet*). GERMANY: Aachen, 6 ♀, coll. Förster. AUSTRIA: 1 ♀, 1 ♂, ? Ruschka. CZECHOSLOVAKIA: 59 ♀, 37 ♂, iv.-17.ix (*Z. Bouček* and *A. Hoffer* colls.). HUNGARY: Tasnád, 1 ♀, Vác. Tudosdomb, 1 ♂, 6.vii.1930, (*J. Bíró*), Tompa, 2 ♂, 16.v, 2 ♀, 25.v.1950, Kelebia, 2 ♀, 10.vi.1949, 2 ♀, 19.v.1950 (*J. Erdős*) (mostly det. Erdős as *dichrous* Merc.). U.S.S.R., Tbilisi, Lisči, 2 ♀ vi.1957 (*A. Hoffer* and *J. Dlabola*).

Ericydnus caudatus Erdős

1957 *Ericydnus caudatus* Erdős, *Acta Zool. hung.* **3**: 23-4.

Differs from *ventralis* Dalman as follows: ovipositor sheaths projecting by about two-fifths length of gaster: microsculpture on frontovertex and dorsum of thorax decidedly more outstanding.

So exceeding like *ventralis* Dalman in all other respects that I can only regard it as a mutant form that is perhaps evolving into a distinct species through the development of different oviposition habits.

Material studied. CZECHOSLOVAKIA: 9 ♀, 2 ♂, iv.-25.viii, (*Z. Bouček* and *A. Hoffer* colls.). HUNGARY: Tompa, 2 ♀, 16, 1 ♀, 30.vi.1950, 1 ♀, 1 ♂, 7.vii.1951, (*J. Erdős*) (cotypes).

Ericydnus japonicus (Tachikawa)

1963 *Grandoriella japonica* Tachikawa, *Mem. Ehime Univ.* VI **9** (1): 58-61, figs. 11-12.

1966 *Ericydnus japonicus* Tachikawa; Kerrich, *Opusc. ent.* **31**: 119.

The following redescription was made from a single female paratype kindly sent on loan by Professor Tachikawa, by direct comparison with the European species of *Ericydnus*, especially *E. ventralis* Dalman.

Head, seen from above, resembling that of *ventralis* Dalman in being relatively narrow and rather elongate, but with eyes nearly reaching back of head, and not having the occiput visible behind the occipital margin: in facial view more elongate and with cheeks little rounded. Frontovertex with reticulate microsculpture relatively coarse and sharp, though less outstanding than in *caudatus* Erdős; with piliferous punctures, except in inter-ocular area, relatively small and sparse, the orbitals not small but also sparse, separated by much more than their own diameters: cheeks finely striate-reticulate. Eyes rather coarsely and sparsely hairy.

Antenna (see description and figure of Tachikawa (1963)) with scape relatively elongate, slightly over-reaching the median ocellus, and with pedicellus (according to Tachikawa's figure) decidedly but not greatly shorter than the first funicle segment (15: 17).

Pronotum, mesoscutum, axillae and scutellum very finely and weakly reticulate, sparsely beset with weak piliferous punctures that mostly are separated by much more than their own diameters. Scutellum sharply margined, very weakly laminate at apex, little raised above metathorax. Mesopleura extremely finely alutaceous in front, weakly reticulate behind. Propodeum on sides weakly reticulate, a little finer than on hinder part of mesopleura, above finely alutaceous, with a scarcely defined median area that is not markedly raised at mid base: keels running back from inner side of spiracles developed but difficult to see.

Fore wings as described and figured for *ventralis* Dalman, but the radial and postmarginal relatively longer (see Tachikawa's illustrations).

Frontovertex a deep blue-green behind, merging to strong red-violet just above the interscrobal prominence; the latter again deep blue-green, together with areas to the side of it and the mouth region: cheeks dull bronzy. Pronotum, except at sides below, dull green with

bright reflection. Remainder of thorax and abdomen bright testaceous, the mesoscutum having weak red-violet reflection: lateral areas of metanotum, and gaster in large part above and at sides, blackish with weak green reflection. Mandibles pale testaceous, darkened at apices. Antennae with scape and pedicellus bright testaceous, the latter considerably darkened above: flagellum (according to original description) black. Legs bright testaceous, with fore and mid tarsi somewhat darkened, and hind tibiae and tarsi mostly blackish.

Ericydnus strigosus (Nees)

(Text-figs. 28, 31)

Ericydnus longicornis auctt. plur. (non Dalman, 1820).

1834 *Encyrtus strigosus* Nees ab Esenbeck, *Hymenopterorum Ichneumonibus affinium Monographiae* 2: 227-8.

1837 *Ericydnus strigosus* (Nees) Walker, *Ent. Mag.* 4: 334.

1872 *Metallon atriceps* Walker, *Notes on Chalcididae* 7: 115-6.

1876 *Ericydnus longicornis* Dalman; Mayr, *Verh. zool.-bot. Ges. Wien* 25: 763-4 [Mis-identification].

1876 *Ericydnus apterogenes* (Förster MS.) Mayr, *Ibidem*, 25: 763-4.

1921 ? *Ericydnus dichrous* Mercet ♂ (non ♀), *Trab. Mus. nac. Cienc. nat., Madr.*: 159-60, 165-7, fig. 50.

1966 *Ericydnus strigosus* (Nees); Kerrich, *Opusc. ent.* 31: 119.

Head, seen from above, rather narrow (i.e. narrower than in macropterous forms of *sipylus* Walk.); in facial view with cheeks slightly to moderately rounded. Frontoververtex with reticulate microsculpture fine to very fine; with piliferous punctures within and beside ocellar area mostly separated by less than their own diameters, those before median ocellus much sparser but not absent from the median area, and with orbitals not very small: face and cheeks very finely scaly-reticulate. Eyes moderately densely hairy, distinctly so $\times 25$.

Antenna with scape not reaching median ocellus; with pedicellus nearly twice as long as broad, and about equal in length to first segment: funicle broadening rather gradually, with segments gradually decreasing in length, the first about one and a half times as long as broad, the sixth almost as broad as long: club distinctly more than combined length of the two preceding segments.

Pronotum, mesoscutum, axillae and scutellum with reticulate microsculpture fine, beset with moderate piliferous punctures that are not very superficial and mostly are separated by about their own diameters. Scutellum (Text-fig. 28) relatively narrow, dorsally almost flat, strongly laminate at apex. Mesopleura rather strongly scaly-reticulate, often quite coarsely so behind. Propodeum (Text-fig. 28) reticulate on sides, and with a reticulate median area which sometimes contains a strong median keel; elsewhere very finely alutaceous and shining, with transverse keels rather weak to rather strong.

Fore wings (Text-fig. 31) moderately narrow.

In this species there is a considerable range of microptery, from forms with fore wings hardly reaching apex of propodeum to others with fore wings covering the gaster for about two-thirds its length. Micropterous are much less frequently found than macropterous forms.

Male antennae with scape reaching about to median ocellus; with pedicellus twice as long as broad or less, decidedly shorter than first funicle segment; with flagellum longer than that of female; funicle almost filiform, showing considerable intra-specific variation in proportions of the individual segments, but the segments gradually increasing in length: club about equal to combined length of the two preceding segments, tapering strongly to apex.

Coloration in middle European latitudes—frontoververtex, inter-scribal prominence usually, pronotum above, mesoscutum above, axillae, scutellum and sides of propodeum a rather dark green, with reddish violet and bronzy reflections in very varying proportion: colour from frontoververtex merging through peacock-blue, which is seen also on inter-scribal prominence, to the upper face which usually is mostly reddish violet; lower face, cheeks, temples, occiput and

propleura brownish black with indeterminate metallic coloured reflections of moderate strength : remainder of thorax, propodeum above and gaster brownish black (faded to medium brown in old specimens), with mostly weak and indeterminate metallic reflections, but the gaster above often determinately dark green in part. Male gaster generally largely pale brown at base. Mandibles pale brown, darker at apices. Antennae brownish black, the scape and pedicellus with faint dark green reflections. Legs dull testaceous, to a greater or lesser extent darkened more especially on hind legs, the fore coxae usually only darkened at extreme base though sometimes much more extensively.

Coloration in Madeira—head a decidedly brighter green, with duller reflections little in evidence : thorax and abdomen for the most part chrome-yellow : mesopleura except in front, and propodeum between spiracles and median area, blackish with metallic reflections : gaster above in about apical half dark green. Antennae with scape and pedicellus usually paler. Legs bright testaceous, with only the tarsal apices more than slightly darkened.

The main collection of Nees ab Esenbeck is known to have been destroyed. Three specimens of this species, two female and one male, stand as *strigosus* Nees in the Walker collection, and I accept the interpretation of Walker as first reviser. Further, although Mayr (1875) stated that Förster also determined another species as *strigosus*, the only two specimens now in the Vienna museum labelled by Förster as *strigosus* belong to this species.

A single mount in the Vienna museum is labelled "Er. apterogenes Förster, type" and also "Aachen". It bears five very small pins, from one of which the specimen is missing. The four remaining specimens I determine as brachypterous males of *strigosus* Nees: one of these, as indicated by my own label, I designate as LECTO-TYPE.

Of Spanish material determined by Mercet as *longicornis* Dalm., I have seen one female and one male of this species, and one female of a species only subsequently recognized as distinct.

In the British Museum collection there have stood as *atriceps* Walker a macrop-terous male, and one macropterous and five brachypterous females. The macropterous female bears the green Walker type label and the label *Metallon atriceps* in Walker's writing, but from the original publication one would deduce that the male was the type. Fortunately this series is clearly conspecific. A study of intermediates from southern Italian islands confirms my conclusion that this is a colour form of *strigosus* Nees.

Material studied. ENGLAND: unlocalized, 2 ♀, 1 ♂, Walker coll., 2 ♀, 2 ♂, Hope-Westwood coll., 1 ♀, 2 ♂, Dale coll.; N. Devon, Martinhoe Common, 1 ♀, 22.vii.1955 (J. A. & D. J. Clark); Oxon., Lewknor, 1 ♂, 2.vi.1957, Bald Hill, 2 ♀, 18.vii.1957; Bucks., Hell Coppice, 1 ♂, 23.vii.1957; Kent, West Wood, 1 ♀, 6.ix.1957; Lincs., Woodhall Spa, 1 ♂, 25.vii.1951 (*M. de V. Graham* or *M. F. Claridge*); Berks., Silwood Park, 3 ♀, 2 ♂, em. 4.vii–13.ix.1949, ex *Heterococcus pulverarius* (Newst.) (*K. Boratynski*). SWEDEN: Skåne, Småland, and Västergötland, 3 ♀, 4 ♂, Thomson coll.; Skåne, Dalby, 1 ♀, 13.v., 1 ♂, 7.vi.1938 (*D. M. S. & J. F. Perkins*); Stockholm district, 1 ♀, 31.viii.1951, Närke, Örebro district, 1 ♂, 9.vi.1954 (*A. Jansson*). MADEIRA: 6 ♀ 1 ♂ (*Wollaston*) (material of *atriceps* Walker). SPAIN: Madrid province, Cercedilla, 1 ♀, viii.1916, 1 ♂, 20.vii.1917 (*C. Bolivar*). ITALY, Pantelleria, 2 ♀, vii.1954 (*Pippa*); Sicily, Madonia, 9 ♀, 2 ♂, ix.1954 and 1955 (*Gendago*). AUSTRIA: 4 ♀, 5 ♂ (? all *Ruschka*); Leithagebirge, 1 ♀, 26.vii.1951, coll. of G. Domenichini.

GERMANY: Aachen, 3 ♀, 4 ♂ (*A. Förster*) (including syntypes of *apterogenes* (Först. MS.) Mayr. CZECHOSLOVAKIA: 136 ♀, 133 ♂, iv-x (*Z. Bouček & A. Hoffer* colls.). HUNGARY: Szigetszentmiklos, 1 ♀, x.1911, Nagyened, 1 ♀, 1917, Vácduka, 1 ♀, 3.ix.1925, Fejérvárcsvrgó, 1 ♂, 29.vii.1923, Tihany, 1 ♂, 25.ix.1930 (*J. Biró*); Tompa, 1 ♂, x.1954 (*Z. Bouček*). U.S.S.R.: Odessa, 1 ♀, vi.1957, Tbilisi, 4 ♀, 3 ♂ (*A. Hoffer & J. Dlabola*).

Ericydnus robustior Mercet

(Text-figs. 26, 29, 32)

1921 *Ericydnus ventralis* var. *robustior* Mercet, *Trab. Mus. nac. Cienc. nat., Madr.*: 164.

1952 *Ericydnus aeneus* Nikol'skaya, *Opred. Faune SSSR*, **44**: 356-7.

1966 *Ericydnus robustior* Mercet; Kerrich, *Opusc. ent.* **31**: 119.

Head, seen from above (Text-fig. 26) broad, broadly and distinctly emarginate in front; in facial view with cheeks very little rounded. Frontovertex with punctuation as described for *strigosus* Nees, but with reticulation sharper and more outstanding: face and cheeks finely scaly-reticulate. Eyes moderately densely, conspicuously white-hairy, very distinctly so $\times 25$.

Antenna relatively more elongate than in *strigosus* Nees, with scape generally over-reaching the median ocellus: funicle broadening more gradually and with segments hardly decreasing in length, the first one-third longer than the pedicellus, the sixth one-third longer than broad: club a little more or less than combined length of the two preceding segments.

Thorax structure as described for *strigosus* Nees, but scutellum (Text-fig. 29) weakly laminate at apex: scutellum dorsally almost flat in female, but moderately convex in male. Propodeum with reticulation on median area weaker than in *strigosus* Nees, often hardly developed.

Male antennae with pedicellus not much longer than broad: flagellum stouter in basal half than in *strigosus* Nees, tapering markedly and with segments becoming gradually shorter from middle: club about equal to combined length of the two preceding segments.

Fore wings (Text-fig. 32) of breadth normal in the Encyrtidae, i.e. decidedly broader relatively than in other species of this genus. Micropterous forms scarce.

Coloration normally (f. *aeneus* Nik.) very much as described for middle European populations of *strigosus* Nees, but antennae and legs tending to be darker, the fore coxae generally pale only at extreme apex.

Coloration of the unique female type of *robustior* Merc. is as follows: head a decidedly brighter green, with duller reflections little in evidence: thorax and propodeum for the most part chrome-yellow: pronotum except broadly behind, and mesoscutum medially in front, blackish with blue-green reflection: mesoscutum and scutellum in middle with extensive light red-violet reflection: metanotum, and propodeum above between spiracles, black with bright reflection: gaster mostly blackish, overspread with dark green to bronzy reflections, dull testaceous at sides near base. Antennal scape dull testaceous. Legs dull testaceous, with hind tibiae and tarsi, and about apical half of fore tarsi, decidedly darkened. Fore wings moderately infusate around about apical half.

It is noteworthy that the mesopleura are chrome-yellow in this form, whereas in the similarly coloured Madeiran form of *strigosus* Nees they are mainly blackish.

I have been able to make direct comparison between the unique type of *robustior* Merc., a paratype of *aeneus* Nik. and other material of the green-bodied form. Despite the striking colour difference, and that both yellow-bodied and green-bodied forms have been taken within the province of Madrid, I find no significant difference in structure, and have to regard the forms as conspecific.

Holotype ♀ studied. SPAIN: Madrid province, El Escorial, 4.vii.1918 on *Quercus* (*G. Mercet*).

Material studied of f. *aeneus* Nik. SWEDEN: Närke, Örebro, Brickebacken, 1 ♀, 4.viii.1955 (*A. Jansson*). SPAIN: Madrid province, Cercedilla, 1 ♀, 24.viii.1917 (*C. Bolivar*). FRANCE: Montpellier, 2 ♀, 20.ix.1951, associated with *Pinus* (*E. Biliotti*). CZECHOSLOVAKIA: 17 ♀, 14 ♂, 5.v-2.ix. (*Z. Bouček* and *A. Hoffer* colls.). U.S.S.R.: Bukhara region, 1 ♀, 8.ix.1948 (*Petrova*) (paratype of *aeneus* Nik.).

Ericydnus longicornis (Dalman)

(Text-fig. 33)

1820 *Encyrtus longicornis* Dalman, *K. svenska Vetensk-Akad. Handl.* **41** : 165-6.

1861 *Ericydnus atripes* Förster, *Programm Realschule Aachen* **1860-61** : xxxiii.

1966 *Ericydnus longicornis* (Dalman) ; Kerrich, *Opusc. ent.* **31** : 119.

Head from above broad, scarcely emarginate anteriorly ; in facial view with cheeks distinctly rounded. Frontoververtex with reticulate microsculpture relatively sharp and outstanding, and with piliferous punctation relatively sparse ; the punctures in and beside the ocellar area are mostly separated by more than their own diameters, and there is a sparse row of comparable sized punctures on each side close to the orbital rows, leaving the frontoververtex very broadly impunctate before the median ocellus. Eyes relatively weakly and sparsely hairy.

Antenna with scape distinctly over-reaching median ocellus : with pedicellus one and a half times as long as its greatest breadth and two-thirds length of the first funicle segment : funicle broadening strongly to middle, the first segment one and two-thirds times as long as broad, the fourth only slightly longer than broad, and the fifth and sixth slightly broader than long ; club equal to the combined length of the two preceding segments, and equal to them in width.

Reticulate microsculpture on pronotum and mesoscutum extremely fine, that on axillae and scutellum sharper : piliferous punctures on these sclerites fine and superficial, mostly separated by distinctly more than their own diameters. Scutellum relatively broad and convex, weakly laminate at apex. Mesopleura shining, no more than finely alutaceous. Propodeum finely reticulate on sides, shining and very finely alutaceous above, with no distinct median area.

Fore wing of moderate breadth, with marginal vein relatively shorter than in *strigosus* Nees but with postmarginal relatively longer, more than twice the length of the marginal ; in female with a broad fascia of infuscation along outer half of fore margin and a weaker one along outer half of hind margin (Text-fig. 33). Micropterous forms unknown.

Male flagellum relatively stout, slightly spindle-shaped, i.e. tapering markedly from middle to both base and apex ; club appreciably less than the combined length of the two preceding segments.

Frontoververtex, pronotum above, mesoscutum, axillae and scutellum very dark green to indigo, merging to red-violet or bronzy on face and cheeks : pleura and abdomen a more or less bright testaceous, the pleura usually in greater part, and propodeum and gaster largely above, over-spread with blackish. Mandibles pale brown, darker at apices. Antennae having scape testaceous, slightly to moderately darkened above, and pedicellus and flagellum brownish black with weak metallic reflections. Legs testaceous, with darkening on usually only the fore coxae at base, on all femora above in about apical half, and on all tibiae and tarsi.

Male differs as follows : pleura, propodeum and gaster brownish black with weak reflections. Antennal scape much less markedly paler than pedicellus and flagellum.

It would not have been possible for me to gain an adequate idea of this species but for the loan of a series of specimens from the collections of Drs. Z. Bouček and A. Hoffer, and it is no wonder that the unique type in the Stockholm museum, which I have studied, has invariably been misinterpreted in literature.

I have also studied the unique male type of *atripes* Förster, which is in the Vienna museum. The locality, in eastern Switzerland, appears to be the furthest west that the species is known.

Material studied. SWEDEN: unlocalized, ♂ type. SWITZERLAND, Roseg Tal, ♂ type of *atripes* Förster. AUSTRIA: Lower Austria, Gars, 1 ♂, 5.vii.1904 (?*Ruschka*). CZECHOSLOVAKIA: 7 ♀, 1.vi.–18.viii, 33 ♂, 18.v.–17.ix (Z. *Bouček* and A. *Hoffer* colls.). U.S.S.R.: Caucasus, Mt. Elbruz, 2,200–2,500 m., 1 ♀, viii.1960 (E. S. *Sugonyaev*).

Ericydnus sipylus (Walker)

(Text-figs. 27, 34–35)

- 1837 *Encyrtus sipylus* Walker, *Ent. Mag.* **4** : 445.
 1838 *Encyrtus baleus* Walker, *Ibidem*, **5** : 428.
 1861 *Encyrtus basalis* Förster, *Programm Realschule Aachen* **1860–61** : xxxiii.
 1875 *Ericydnus latiusculus* Thomson, *Hymenoptera Scandinaviae* **4** : 125.
 1876 *Ericydnus ventralis* var. *biplagiatus* (Förster MS.) Mayr, *Verh. zool.-bot. Ges. Wien* **25** : 763, 765.
 1921 *Ericydnus ventralis* Dalman; Mercet, *Trab. Mus. nac. Cienc. nat. Madr.*, 159–60, 162–4 [Mis-identification].
 1949 *Ericydnus ventralis* var. *biplagiatus* Mayr; Hellén, *Notul. ent.* **29** : 43.
 1952 *Ericydnus bicolor* Nikol'skaya, *Opred. Faune SSSR* **44** : 356–7.
 1966 *Ericydnus sipylus* (Walker); Kerrich, *Opusc. ent.* **31** : 120.

Head, seen from above, moderately broad, regularly rounded or scarcely emarginate in front, in facial view with cheeks generally almost rectilinear. Frontovortex with reticulate microsculpture regular and rather outstanding; with piliferous punctures relatively sparse, usually nearly all being separated by more than their own diameters, and the orbitals very small; face and cheeks moderately reticulate. Eyes moderately densely hairy, very distinctly so $\times 25$.

Antenna with scape not reaching median ocellus; with pedicellus greatly narrowed to base, twice as long as broad and slightly longer than first funicle segment: funicle broadening gradually, with segments gradually decreasing in length from the second, the first one and three-quarter times as long as broad, the sixth almost as broad as long: club gradually broadening from funicle, almost the combined length of the three preceding segments.

Pronotum, mesoscutum, axillae and scutellum dull, finely alutaceous, beset with piliferous punctures that are sharp but fine, and are separated by more than their own diameters. Scutellum (Text-fig. 27) relatively broad, markedly more convex than in most species, strongly laminate at apex. Mesopleura moderately reticulate. Propodeum with sides moderately reticulate; with median area bordered by and containing longitudinal keels, but not much less finely alutaceous than the areas flanking it; with transverse keels sharp, the segment rather sharply declived behind them.

Fore wing (Text-fig. 34) relatively a little broader than in *strigosus* (Nees), and with marginal vein relatively short.

Head for the most part blue-green, with indeterminate metallic reflections, very occasionally red-violet, the upper face more bronzy. Thorax and abdomen bright testaceous, having large, pale blackish marks with weak green reflection which normally are as follows: pronotum except at sides extending on to mesoscutum, axillae almost wholly, large central mark on scutellum, mesopleura, propodeum except on median area, and about hinder half of gaster above. Mandibles testaceous, only slightly darkened at apices. Antennae with scape and pedicellus pale brown, to a greater or lesser extent darkened above; with flagellum brownish black, with weak metallic reflections. Legs pale testaceous, with only the tarsal apices more than slightly darkened.

Male antenna with scape over-reaching median ocellus: with pedicellus $1\frac{1}{2}$ times as long as broad, decidedly shorter than first funicle segment; with flagellum longer than that of female: funicle almost filiform, the segments increasing gradually in length: club decidedly less than combined length of the two preceding segments (9 : 11), tapering strongly to apex.

Brachypterous forms of both sexes have the legs often much more darkened, especially the hind femora near apex and the hind tibiae; the undarkened parts are a duller testaceous. Brachypterous males have the darkened parts of the thorax and abdomen a decidedly brighter blue-green: macropterous males are unknown.

E. sipylus f. *baleus* Walker differs as follows: head sometimes as bright a blue-green but usually duller, often with bronzy reflection: thorax and abdomen dull blue-green, with no testaceous colouring or almost none, sometimes a little on and adjoining the tegulae. Antennal scape and pedicellus generally considerably darkened. Legs, as in brachypterous specimens of f. *sipylus*, generally darkened.

Text-fig. 35 illustrates a wing typical of this form. There is not much size range, for the wing covers the first large tergite to about half its length; but there is considerable variation in shape, for the wing may be much more or much less pointed than as shown.

In this species, macropterous female specimens with extensive bright testaceous coloration are normal in middle European latitudes, and those without such coloration extremely rare. Micropterous females have been collected in perhaps larger numbers than the macropterous, and of these, forms with little or no testaceous coloration (f. *baleus* Walker) and those coloured more like the normal macropterous specimens are about equally numerous. Micropterous females and males have been collected in about equal numbers, but macropterous males are unknown. This is the only species of the genus known in North America, where it has been found only in California and only in the micropterous form.

In the British Museum collection are two female specimens labelled *sipylus* in Walker's writing: the micropterous specimen must be the type, but fortunately it is a relatively well characterized specimen with coloration so similar to that of the macropterous that one can be confident of its identity.

A single brachypterous green-bodied female specimen is labelled *baleus*, and this I take to be the type.

In the Thomson collection there are two mounts standing as *latiusculus*. One is labelled "Hlm. Stål" and bears a specimen of *sipylus* f. *baleus*, while the other is labelled "Ö" (=Öland) and bears two specimens, the upper a female *sipylus* f. *baleus* and the lower a brachypterous male of *strigosus* Nees. Professor C. H. Lindroth writes that, despite extensive search, no specimen standing as *latiusculus* from Småland has been found among Thomson's duplicate material. Consequently I designate the specimen collected by Stål in the Stockholm district as NEOTYPE of *latiusculus* Thomson, which thus falls in synonymy with *sipylus* f. *baleus* Walker. It is possible that Thomson made a *lapsus* in recording the locality, for he had other *Ericydnus* collected in Småland by Boheman, who had a country house in that province.

In the Vienna museum there are eight mounts labelled "Er. basalis Förster, type", but only three of these are also labelled to indicate the locality Roseg Tal in the Engadine, Switzerland. From these I select and designate the one remaining female specimen as LECTOTYPE and determine it as a brachypterous *sipylus* Walker. The specimens on the five other mounts are *Protyndarichus britannicus* Alam. All twelve specimens standing as *biplagiatus* Först. are brachypterous forms of *sipylus* Walk. The first four mounts comprising five specimens are labelled "Er. biplagiatus Förster, type". I select and designate the first specimen as LECTOTYPE.

I have studied a Spanish specimen determined by Mercet as *ventralis*. I have also been able to study a paratype of *bicolor* Nik.

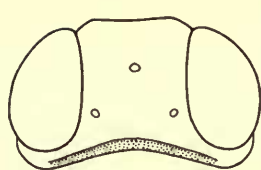
Material studied of f. *sipylus* Walker. ENGLAND: near London, 2 ♀ (including type), F. Walker coll.; unlocalized 3 ♀, Hope-Westwood coll.; Berks., Silwood Park, 2 ♀, 15-30.viii.1949, one *ex Heterococcus pulverarius* (Newst.), (K. Boratynski); Kent, Bedgebury, 1 ♂, 4.viii.1935 (O. W. Richards). SWEDEN: unlocalized, 1 ♀, 18.viii., Zetterstedt coll.; Småland and Gotland, 1 ♀, 2 ♂, Thomson coll. FINLAND: Nystad, 1 ♀, (W. Hellén). SPAIN: El Pardo, 1 ♀, 10.vi.1919 (C. Bolivar). GERMANY: Aachen, 14 ♀, (A. Förster) (as *biplagiatus* (Först. MS.) Mayr). SWITZERLAND: Roseg Tal, 1 ♀, 4 ♂, (A. Förster) (as *basalis* Först.). CZECHOSLOVAKIA: 105 ♀, 8 ♂, 5.vi.-16.ix. (Z. Bouček and A. Hoffer colls.). U.S.S.R.: Crimea, Sebastopol, 1 ♀, 2.iii.1911 (W. Pliginskii) (paratype of *bicolor* Nik.). U.S.A.: California, Los Angeles, 1 ♀, Provancher coll.; San Bernadino, Mill Creek, 1 ♂, 5.x.1947, on *Erigonum subscapum* (P. H. Timberlake).

Material studied of f. *baleus* Walker. ENGLAND: Oxon. 1 ♀, 2.vi., 1 ♂, 5.vii.1957 (M. F. Claridge); Surrey, Box Hill, 1 ♀, 2.vii.1964 (Z. Bouček). SCOTLAND: Ross-shire, Gairloch, 1 ♀, 3.vii.1934 (O. W. Richards). SWEDEN: Stockholm district, 1 ♀ (Stål) (neotype of *latiusculus* Thomson); Öland, 1 ♀, Thomson coll.; Gotska Sandön, 1 ♀, Närke, Örebrö, 1 ♀, 21.vi.1941 (A. Jansson). FRANCE: Fontainebleau forest, 1 ♀ (F. Walker) (type). CZECHOSLOVAKIA: 175 ♀, 44 ♂, 1.iv.-20.ix. (Z. Bouček & A. Hoffer colls.). HUNGARY: Tasnad, 1 ♀, 8.vii.1912, Vácduka, 1 ♀, 6.vii.1930 (J. Biró). U.S.S.R.: Odessa, 2 ♀, 1 ♂, Tbilisi, 5 ♀, 2 ♂, vi.1957 (A. Hoffer & J. Dlabola).

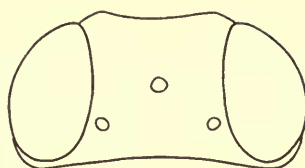
KEY TO SPECIES OF *ERICYDNUS* WALKER: MACROPTEROUS FORMS

- 1 Head, seen from above (e.g. Text-fig. 25) relatively elongate and narrow: scutellum hardly or very weakly laminate at apex: fore wings (Text-fig. 30) relatively very narrow: frontoververtex, at least in part, and mesoscutum in middle at least tinged with, reddish violet 2
- Head, seen from above (Text-fig. 26) shorter and broader, scutellum rather weakly to strongly laminate at apex (Text-figs. 27-29); fore wings (Text-figs. 31-34) relatively broader 4
- 2 Head, seen from above (Text-fig. 25) with eyes not nearly reaching back of head, and having occiput extending back so that in this view it is clearly visible behind the occipital margin; in facial view with cheeks well rounded: antennal scape (♀) nearly reaching the median ocellus: eyes rather densely hairy: punctuation of frontoververtex and dorsum of thorax (see description): propodeum distinctly raised at mid base: Europe 3

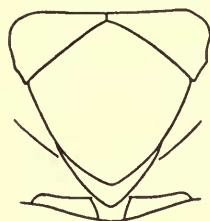
FIGS. 25-35. *Ericydnus* species, females. 25-26. Head, seen from above, of 25, *E. ventralis* (Dalm.) and 26, *E. robustior* Merc. f. *aeneus* Nik. 27-29. Scutellum and propodeum, seen from above, of 27, *E. sipylus* (Walk.); 28, *E. strigosus* (Nees) and 29, *E. robustior* Merc. f. *aeneus* Nik. 30-35. Right fore wing of 30, *E. ventralis* (Dalm.); 31, *E. strigosus* (Nees); 32, *E. robustior* Merc. f. *aeneus* Nik.; 33, *E. longicornis* (Dalm.); 34, *E. sipylus* (Walk.) and 35, *E. sipylus* Walk. f. *baleus* (Walk.). teg. = tegula.



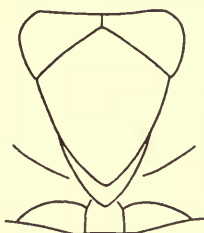
25



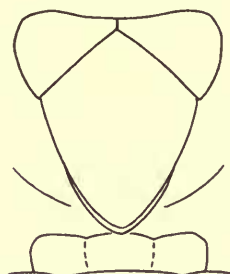
26



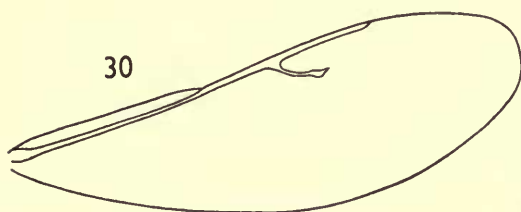
27



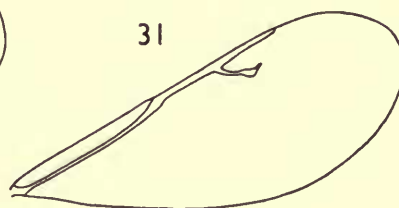
28



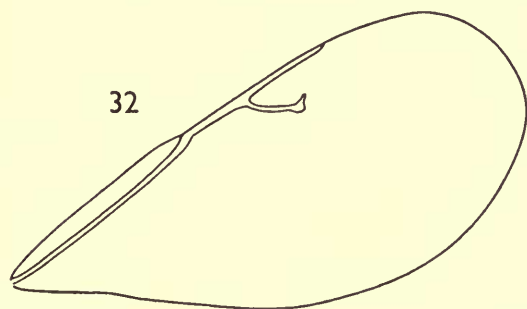
29



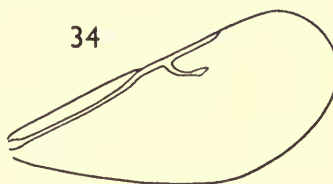
30



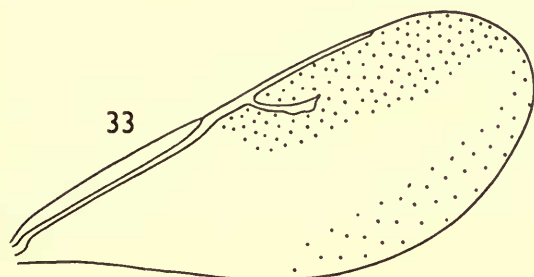
31



32



34



33



35

Head, seen from above, with eyes nearly reaching back of head, and with occiput not visible in this view behind the occipital margin; in facial view with cheeks little rounded: antennal scape (♀) relatively elongate, slightly over-reaching the median ocellus: eyes rather sparsely hairy: punctation of frontovertex and dorsum of thorax much finer and sparser: propodeum not markedly raised at mid base: Japan

japonicus (Tachikawa)

- 3 Styli not or hardly projecting: frontovertex and dorsum of thorax with very finely reticulate microsculpture *ventralis* (Dalman)
- Styli projecting by about two-fifths length of gaster: frontovertex and dorsum of thorax with microsculpture decidedly more outstanding *caudatus* Erdős
- 4 Scutellum rather weakly laminate at apex (Text-fig. 29): head relatively broad (Text-fig. 26): fore wings relatively broad *or* with postmarginal vein more than twice length of marginal: funicle of male antenna stout 5
- Scutellum strongly laminate at apex (Text-figs. 27–28): head narrower: fore wings narrow or moderately narrow (Text-figs. 31, 34), the postmarginal vein not twice the length of the marginal: funicle of male antenna almost filiform 6
- 5 Frontovertex with a row of moderate punctures on each side close to the orbitals, broadly impunctate between these before median ocellus: cheeks distinctly rounded: eyes relatively weakly and sparsely hairy: mesopleura shining, no more than finely alutaceous: fore wing of moderate breadth, with postmarginal vein more than twice length of marginal, in female with a broad fascia of infuscation along outer half of fore margin and a weaker one along outer half of hind margin: scutellum moderately convex in both sexes: funicle of female antenna broadening strongly to middle, thence about parallel-sided, the sixth segment slightly broader than long: funicle of male antenna stoutest in middle tapering to both base and apex, with club appreciably less than combined length of the two preceding segments *longicornis* (Dalman)
- Frontovertex distinctly though sparsely beset with moderate punctures in middle before median ocellus: cheeks very little rounded: eyes moderately densely, conspicuously white-hairy: mesopleura scaly-reticulate: fore wing broad, with postmarginal vein less than twice length of marginal, almost hyaline in both sexes: scutellum flatter dorsally in female: funicle of female antenna broadening much more weakly right to apex, the sixth segment distinctly longer than broad: funicle of male antenna stoutest near base, tapering to apex, with club equal to combined length of the two preceding segments *robustior* Mercet (= *aeneus* Nikol'skaya)
- 6 Scutellum relatively broad and convex (Text-fig. 27): propodeum sharply declived behind the transverse keels, with surface of median area little more strongly alutaceous than the dorsal areas to the side of it: orbital piliferous punctures minute, mostly separated by more than their own diameters: head regularly rounded anteriorly, in facial view with cheeks almost rectilinear: fore wings (Text-fig. 34) of moderate breadth, with marginal vein relatively short: thorax and base of gaster with extensive bright testaceous coloration (Spain to Finland): macropterous males unknown, and brachypterous male very scarce . . . *sipylus* (Walker)
- Scutellum relatively narrow, dorsally almost flat (Text-fig. 28): propodeum not sharply declived behind the transverse keels, the median area with stronger reticulate microsculpture: orbital piliferous punctures, though small, not minute, separated by about their own diameters: head shallowly emarginate anteriorly, in facial view with cheeks moderately rounded: fore wings (Text-fig. 31) narrow, with marginal vein relatively longer: dorsum of thorax, in middle-European populations, a rather dark green (though chrome-yellow in Madeira and intermediates occurring in Mediterranean area); macropterous males and females about equally often encountered *strigosus* (Nees)

KEY TO SPECIES OF *ERICYDNUS*: REDUCED WINGED FORMS

- 1 Head, seen from above, having occiput extending back so that it is clearly visible behind the occipital margin: [forms with very reduced wings unknown] **ventralis** (Dalman)
Head, seen from above, having occiput not thus extending back, and not seen in this view behind the occipital margin 2
- 2 Orbital piliferous punctures minute, mostly separated by distinctly more than their own diameters: propodeum sharply declived behind the transverse keels: scutellum broad, strongly laminate at apex 3
Orbital piliferous punctures, though small, not minute, separated by about their own diameters: propodeum not sharply declived behind the transverse keels: if the scutellum is strongly laminate at apex it is less broad 4
- 3 Thorax and base of gaster with extensive bright testaceous coloration . **sipylus** (Walker)
Thorax without, or with very little, testaceous coloration
sipylus (Walker) f. **baleus** (Walker) (= *latiusculus* Thomson of neotype)
- 4 Scutellum rather weakly laminate at apex (Text-fig. 29) and tending to be broader:
head relatively broad (Text-fig. 26) **robustior** Mercet
Scutellum strongly laminate at apex (Text-fig. 27) and tending to be narrower:
head narrower **strigosus** (Nees)

Species incorrectly placed in *Ericydnus* Walker*Ericydnus megalarus* (Walker)1838 *Eulophus megalarus* Walker, *Ent. Mag.* 5: 477.1909 *Ericydnus megalarus* (Walker); Schmiedeknecht, *Genera Insectorum* 97: 203.

This species was collected at St. George's Sound, Australia, by C. Darwin. The type specimen was deposited in the British Museum (Natural History), but today there remain only two fore wings largely gummed together and two parts of a leg or legs. These parts seem more likely to be Pteromalid than Encyrtid.

Ericydnus chryscus (Walker)1839 *Pteromalus? chryscus* Walker, *Monographia Chalciditum* 2: 34-5.1909 *Ericydnus chryscus* (Walker) Schmiedeknecht, *Genera Insectorum* 97: 203.

This unique specimen has precisely the same data as the preceding. The head and gaster are missing, but the thorax, propodeum and wings are intact, and also the legs except for one tarsus. My colleague Mr. R. D. Eady has kindly examined this type, and has determined it as genus near *Tanaostigmodes* (Eupelmidae, Tanaostigminae).

Ericydnus reinhardi Mayr1875 *Ericydnus reinhardi* Mayr *Verh. zool.-bot. Ges. Wien* 25: 763-5.

Graham (1958, *Ent. Tidskr.* 79: 151) identified this as a species of *Ectroma* Westwood, but did not see the type. Through the kindness of Dr. E. Königsmann I have examined the undoubted type, a specimen in the Reinhard collection from Dresden labelled with the data quoted by Mayr. I confirm Graham's conclusion. See also Hoffer 1957, *Čas. csl. Spol. ent.* 54: 45-6, 51-2 + Pl. fig. 4.

Ericydnus hemipterus Girault1915 *Ericydnus hemipterus* Girault *Mem. Queensland Mus.* 4: 172.

Riek (1962, *Proc. Linn. Soc. N.S.W.* 87 (2): 151-2) has transferred this species to *Xenoencyrtus* Riek, a genus related to *Ooencyrtus*. There are specimens in the collection of the British Museum (Natural History).

Ericydnus clavicornis Compere1939 *Ericydnus clavicornis* Compere *Univ. Calif. Publs Ent.* **7** (4) : 62-3.

Compere has long since recognized the true generic placement of this species, which is treated in the present work below (p. 225).

Ericydnus ivorensis Risbec, 1953

Through the kindness of Dr. R. M. Quentin of Bondy, I have been able to examine the unique type of this species in London. It is clearly not an *Ericydnus*: my colleague Mr. R. D. Eady considers it closely related to *Ooencyrtus*.

GRANDORIELLA Domenichini, 1951

This genus is very closely related to *Ericydnus* Walker, and the single species has been studied with and is here redescribed in comparison with the *Ericydnus* species.

Grandoriella lamasi Domenichini

(Text-fig. 6)

1951 *Grandoriella lamasi* Domenichini, *Boll. Zool. agr. Bachic.* **17** (3) : 18-21.

Head from above (Text-fig. 6) relatively short and broad, with anterior emargination scarcely perceptible; in facial view (Domenichini, 1951, fig. vii, 4) with cheeks long, almost straight. Frontovortex regularly, rather finely reticulate, beset with very distinct but superficial piliferous punctures, a row along each inner orbit, another row inward of each of these, and other punctures scattered irregularly between and around the ocelli; the median area, however, between median ocellus and scrobal impression, impunctate: face and cheeks much more finely scaly-reticulate.

Antennae [the figure of Domenichini 1951 is apparently inverted] with scape slightly over-reaching median ocellus; with pedicellus short, hardly a quarter longer than broad and hardly longer than the breadth of the first funicle segment; funicle broadening very gradually, the first segment about three times length of its greatest breadth, the sixth about one and two-thirds times: club very little broader than sixth funicle segment, about three-quarters the combined length of the two preceding.

Pronotum, mesoscutum, axillae and scutellum covered with reticulation finer than that on frontovortex and densely beset with weak, superficial piliferous punctures. Scutellum raised well above propodeum, sharply margined but not laminate at apex. Mesopleura scaly-reticulate as on face. Propodeum on sides with reticulation about as on scutellum, between spiracular sulci almost smooth, with no trace of median area or keel, and with transverse keels weakly developed and placed well forward.

Fore wings (see Domenichini, 1951, figs. vi, vii, i, 3).

Frontovortex, pronotum, mesoscutum, axillae, scutellum and sides of propodeum green, with reflections mostly brassy but on hind margin of frontovortex and on scutellum more bronzy: propodeum a rather duller green: colour from frontovortex merging through peacock-blue, which in Californian specimens is seen also on inter-scrobal prominence, to the face and cheeks which are reddish violet: temples, occiput, mesopleura and mesosternum blackish green, with more or less strong metallic reflections: tegulae, postspiracular sclerite and gaster yellow-testaceous, the last tergites, however, more or less extensive green to violet but always leaving the gaster broadly yellow-testaceous at base. Mandibles pale brown, darker at apices. Antennae brownish black, with weak metallic reflections; having scape, except for a line above, and pedicellus at apex and beneath, more or less pale brown. Legs yellow-testaceous, with the following blackened: fore and mid tarsi from about apex of metatarsus, hind femora above, hind tibiae in about apical two-thirds, and hind tarsi.

Redescribed from the following. U.S.A.: California, Fillmore, 2 ♀, 2 ♂, 15.v.1935, ex *Phenacoccus* sp. (J. D. Maple). MEXICO: Morelos, Cuernavaca, 1 ♀, ii.1945, from fruit of *Lantana camara* (N. L. H. Krauss). Material in U.S. National Museum and in British Museum (Natural History).

CLAUSENIA Ishii, 1923

It may happen that a description of a monobasic new genus makes mention of characters that prove later to be of only specific significance; but not many points in Ishii's description have been contra-indicated by the study of further species. However, I should describe the toruli as nearer obovate than oblong. The description of the thorax as elevated at the suture of the mesoscutum and axillae was presumably made from specimens artificially bent in that position. The gaster is normally shorter than the thorax rather than longer, especially in one of the new species; and the ovipositor is not or very little exerted when in a position of rest. Ishii's description "hypopygium prominent; ovipositor extruded" was presumably made from specimens in which these are at least partly everted and not in the normal resting position, and such specimens of *purpurea* Ishii do appear to have the gaster a little longer than the thorax. The proportions given for the wing veins do not apply to all the species; and the hairs distal to the speculum appear to become gradually finer and denser towards wing apex.

The generic description may now be given as follows: integument metallic coloured, weakly sclerotized and weakly sculptured. Head from above sub-reniform (Text-figs. 36-37); with eyes over-reaching occipital margin, pubescent: frontovertex not narrow, finely reticulate, with superficial piliferous punctures: toruli obovate, separated from mouth by less than their own length: scrobal impressions wide and rather deep, meeting above and extending back to a level about a third to half way up orbits. Mandibles bidentate, the upper tooth rounded at apex. Antennae of moderate length and not strongly clavate: scape elongate, not or but little dilated below: funicle 6-segmented, sub-cylindrical, the first segment relatively short, the following slightly and progressively increasing in size: club only moderately wider than funicle. Thorax convex and moderately deep dorsoventrally: mesoscutum with notauli short but discernible: axillae hardly separated: in certain lights a weak subapical furrow, suggesting a frenal furrow, can be traced on the scutellum laterally, reaching the large, sub-apical bristles, in all species except *purpurea* Ishii. Propodeum finely to very finely reticulate. Mid tarsus and tibial spur rather short and stout. Wings relatively short and broad. Fore wings with the usual diagonal speculum arising from near radius; proximal to this with coarse hairs, and with a large hairless area in region of basal cell; distally covered with normal hairs, which become finer and denser towards wing apex: submarginal vein thin and, in African species, hyaline just before its meeting with marginal, gently curved at junction with the obsolete basalis, so that the costal cell is almost parallel-sided for most of its length; having about seven stout hairs on the basal abscissa and a double row on prestigma: marginal vein usually quite three times as long as broad, distinctly longer than radial, and moderately longer or shorter than postmarginal. Gaster usually a little shorter, in one species much shorter, than thorax and propodeum.

Male differs as follows: frontovertex relatively much wider than in female, distinctly wider than an eye; with lateral ocelli separated by about their own diameter from eye (much less in female): toruli higher on face, separated from mouth by distinctly more than their own length. Antennae with scape relatively much shorter, more dilated below; with flagellum sparsely and coarsely hairy (Rosen, 1965, figs. 10 and 21).

Since the species of this genus are weakly sclerotized, specimens easily become distorted; so care must be taken in interpreting some generic and specific characters, especially the shape of the head.

Parthenogenesis is evidently very frequent in this genus. Tachikawa (1963) states that, in *C. purpurea* Ishii, females are commonly produced by unmated females. Rosen (1965) states that males are abundant in *josefi* Rosen but extremely rare in *purpurea* Ishii. I have studied males of *confusor* sp. n., but have seen none of the other three African species.

Clausenia purpurea Ishii

(Text-figs. 36, 38)

1923 *Clausenia purpurea* Ishii, *Bull. imp. Plant Quarant. Stn* 3: 98-101, Pl. XVIII, figs. 1-8.

1963 *Clausenia purpurea* Ishii; Tachikawa, *Mem. Ehime Univ.* VI, 9: 70-72.

1965 *Clausenia purpurea* Ishii; Rosen, *Proc. R. ent. Soc. (B)* 34: 61-63.

Female: head from above (Text-fig. 36) with frontovertex nearly a third the total breadth; in side view with cheeks not sharply narrowed to mouth; in facial view (Text-fig. 38): scrobes moderately impressed. Eyes strongly and densely hairy, very distinctly so $\times 25$. Frontovertex with reticulate microsculpture relatively strong, with piliferous punctation neither fine nor sparse but rather irregular, the punctures separated by once to twice their own diameters: scrobal impressions and genae with reticulation very definite, the latter bearing scattered punctures.

Antenna (Rosen, 1965, fig. 15) with scape distinctly a little dilated below, contracting somewhat to base; with pedicellus somewhat elongate: funicle with first four segments distinctly longer than broad, but fifth and sixth only a very little longer: club moderately stouter than sixth funicle segment, with first suture moderately oblique, and second strongly oblique and curved, nearly obliterating the lower margin of the second segment.

Pronotum, mesoscutum, axillae and scutellum covered with fine reticulation, as on head, the mesoscutum densely beset with piliferous punctures of moderate strength, separated by about or rather more than their own diameters, the scutellum much more sparsely punctate.

Fore wings with marginal vein distinctly longer than radial, and postmarginal about as long as marginal.

Head blue-green to blackish, with bronzy reflections, the inter-scrobal prominence usually bronzy. Pronotum, mesopleura and propodeum above blackish with bright reflections: mesoscutum steely green to bronzy or purplish: scutellum and sides of propodeum mainly a bright reddish purple, occasionally more green. Gaster blue-green, reddish purple and bright bronzy. Antennae having scape pale testaceous, usually darkened above; having pedicellus and flagellum blackish brown, darkened above and with weak metallic reflections, the pedicellus above often distinctly green or purplish. Legs having coxae and fore femora except at apex, mid and hind femora and fore tibiae except at base and broadly at apex, blackish brown with green or purplish metallic reflections; otherwise yellowish testaceous, the mid and hind tibiae darkened above near base, or sometimes more extensively, and the tarsi infusate at apex.

Redescribed from the following. JAPAN: 1 ♀, ix. 1913, ex *Pseudococcus comstocki* Kuwana (S. J. Kuwana), per H. H. Smith; 1 ♀, x. 1917, ex mealybug on citrus (*C. P. Clausen*). CHINA: Hunan, 1 ♀, 9. vii. 1949, coll. Djou; unlocalized, 2 ♀, "ex no. A414" (J. L. Gressitt); no further data, 1 ♀, 23. vi. 1950. FORMOSA: 2 ♀, xii. 1950, 1 ♀, xi. 1951 (T. C. Maa). "PALESTINE" unlocalized, 10 ♀, xi. 1938, ex *Pseudococcus comstocki* Kuwana (N. Bergen) (imported into U.S.A.), no data, 17 ♀, per H. Compere. Material in Citrus Experiment Station, Riverside, and British Museum (Natural History).

Clausenia corrugata sp. n.

(Text-fig. 37)

Female : head from above (Text-fig. 37) relatively slightly broader than in *purpurea* Ishii ; frontovertex relatively narrower, about a quarter the total breadth ; in side view with cheeks sharply narrowed to mouth ; in facial view longer, with cheeks narrowed at about half a right angle : scrobes weakly impressed. Eyes moderately hairy, distinctly so $\times 25$. Head sculpture differing from that described for *purpurea* Ishii in having the punctures larger, those on genae quite large, and the frontovertex with transverse corrugations between median ocellus and top of scrobal impression : scrobal impression smooth just beside and above inter-scrobal prominence.

Antenna with scape narrow, not distinctly dilated below ; with pedicellus and flagellum much as described for *purpurea* Ishii.

Dorsum of thorax decidedly more shining than that of *purpurea* Ishii, the reticulation clear-cut but much finer, and the piliferous punctation on mesoscutum sparser and much sharper, the punctures separated by about or rather less than twice their own diameters. Mesosternum much more strongly sclerotized than in the other species, and produced backwards broadly in middle.

Fore wings with marginal vein almost twice as long as radial, and postmarginal distinctly longer than marginal.

More shining than the other species. Head, pronotum above, metathorax, and propodeum above blackish, with weak, mostly bronzy, metallic reflections : sides of pronotum, mesoscutum, scutellum, and sides of propodeum bright blue-green, with very conspicuous infusion of reddish purple, or propodeum sides may be more blue : mesopleura a much weaker reddish purple on a blackish or brownish background. Gaster blue-green above, bright bronzy in middle ; with metallic reflections much weaker below. Antennae blackish brown with weak metallic reflections : pedicellus above and scape above and at sides coloured almost as mesoscutum. Legs having coxae and trochanters except at apex, and femora except at base and apex, pale blackish brown with weak, mostly purplish, metallic reflections ; otherwise pale testaceous, except that the tibiae are a little darkened above near base, and the tarsi infuscate at apex.

Holotype ♀. GHANA: Tafo, 19.i.1953, ex *Pseudococcus concavocerarii* James on *Theobroma cacao* (R. G. Donald).

Paratypes. GHANA: 3 ♀, same data as holotype. NIGERIA: Ibadan, 1 ♀, 17.v. 1951 (J. T. Davey).

Holotype and paratypes in British Museum (Natural History), paratype in U.S. National Museum.

Clausenia josefi Rosen

1965 *Clausenia josefi* Rosen, *Proc. R. ent. Soc. Lond.* (B) **34** : 61–63.

Head from above shaped similarly to that of *purpurea* Ishii though more deeply emarginate behind ; in side view with cheeks sharply narrowed to mouth ; in facial view rather short, narrowed at more than half a right angle. Eyes just distinctly hairy $\times 25$. Frontovertex with reticulate microsculpture fine, extending on to the scrobal impressions but there becoming much weaker : piliferous punctures before the median ocellus fine and rather sparse, but those on genae considerably larger than in *purpurea* Ishii.

Antenna as described and illustrated by Rosen (1965), notably the scape very slightly dilated below, the lower margin of the second club segment very short, as in *purpurea* and *corrugata*, but the fifth and sixth funicle segments about one and a half times as long as broad.

Pronotum, mesoscutum, axillae and scutellum with microsculpture finer than on frontovertex, and sparsely beset with piliferous punctures that are very fine, rather difficult to discern $\times 65$, and mostly separated by much more than twice their own diameters.

Fore wings (see Rosen, 1965, fig. 7) with marginal vein widened to apex, only slightly longer than radial, and postmarginal slightly longer than marginal.

Head steely green to blackish, with bronzy reflections. Thorax and propodeum reddish purple with strong bronzy and occasional weak green reflections: scutellum with conspicuous bright blue-green colouring near apex; propodeum above blackish with bright reflections. Gaster bright blue-green, with slight bronzy and reddish purple reflections above, very much duller below. Antennae brownish black with moderate metallic reflections, the scape very narrowly paler at base. Legs having coxae and fore femora except at apex, mid and hind femora and fore tibiae except at base and apex, and mid and hind tibiae except at base and on about apical third to half, brownish black with green or purplish reflections; otherwise pale testaceous, the tarsi infusate at apex.

ISRAEL: redescribed from two female paratypes and one further specimen: two male paratypes also studied. Despite the excellent description published by Rosen, it was found necessary to write this redescription in order to make my study of the species fully comparative with that of the other species treated.

Paratypes female and male are deposited in the British Museum (Natural History).

Clausenia guineensis sp. n.

(Text-figs. 39, 42)

Female: head from above about as broad, relatively, as in *purpurea* Ishii, but more deeply emarginate behind; in side view (Text-fig. 42) with cheeks not sharply narrowed to mouth; in facial view (Text-fig. 39) long, with cheeks narrowed at less than half a right angle: scrobes moderately impressed. Eyes just distinctly hairy $\times 65$. Head sculpture much finer than in *purpurea* Ishii, the reticulate microsculpture very fine, and the punctures before median ocellus smaller and much sparser: scrobes and upper part of inter-scrobal prominence shining and almost smooth.

Antenna with scape distinctly a very little dilated below, and with flagellum more slender and elongate than in *purpurea* Ishii: funicle with segment 6 about one and a half times as long as broad, and 5 relatively longer than that: club moderately stouter than sixth funicle segment, with first suture at about a right angle to the axis, and second rather strongly oblique, but leaving the lower margin of the second segment more than half the length of the upper.

Dorsum of thorax covered with fine reticulation, about as strong as that on *purpurea* Ishii and stronger than on head of this species: piliferous punctures on mesoscutum sparser and finer than in *purpurea*, mostly separated by considerably more than their own diameters though less than twice, those on scutellum very fine and sparse.

Fore wings with marginal vein almost twice as long as radial, and postmarginal about as long as marginal.

Head, thorax and propodeum brownish black with metallic reflections: mesoscutum and scutellum reddish purple, often with infusions of bluish, on a background of green: sides of propodeum seldom a decidedly bright purple. Gaster blue-green, reddish purple and bright bronzy. Antennae blackish brown, darkened above and with weak metallic reflections, the pedicellus above and scape above and at sides distinctly purplish, or more rarely greenish, and the scape pale at base. Leg colour as described for *purpurea* Ishii except that the hind femora are more or less narrowly pale at apex.

Holotype ♀. NIGERIA: Ibadan province, Idiaunre, 31.viii.1954, ex *Planococcoides njalensis* (Laing) on *Theobroma cacao* (R. G. Donald).

Paratypes the following: NIGERIA: 1 ♀, same data as holotype but 7.xi.1954; Abeokuta province, Ilaro, 1 ♀, 15.vi.1953, ex *Planococcus kenyae* (Le P.), 1 ♀, 27.i.1954, ex *Planococcus* sp.; Benin province, Utbogiobo, 1 ♀, 15.v.1954, Cameroons

province, near Kumba, 1 ♀, 21.iii.1954, *ex Planococcus citri* (Risso), (all *R. G. Donald*); 6 ♀, Olofin, Agaloke, Otun, Olavo, Akasan and Ojokoro, 6.iii.–15.v.1951 (*J. T. Davey*). GHANA: all *ex Planococcoides njalensis* (Laing) on *Theobroma cacao*, Tafo, 5 ♀, xi.1949 (*F. E. Decker*), 4 ♀, 18.iii, 3 ♀, v.1949, 1 ♀, 6.iv.1950, Oyoko, 1 ♀, 30.iv.1950 (*R. G. Donald*).

Holotype in British Museum (Natural History); paratypes in British Museum (Natural History), in U.S. National Museum, in Citrus Experiment Station, Riverside, in Australian National Collection, in Museum d'Histoire Naturelle, Geneva, in Národní Museum, Prague, in West African Cacao Research Institute, in Coryndon Museum, Nairobi, and in Department of Agriculture, Pretoria.

Clausenia comperei sp. n.

(Text-fig. 41)

Head from above about as broad, relatively, as in *purpurea* Ishii, and about as deeply emarginate behind; in side view (Text-fig. 41) with cheeks rather sharply narrowed to mouth; in facial view long, with cheeks narrowed at less than half a right angle: scrobes deeply impressed. Eyes distinctly hairy $\times 45$. Head sculpture even weaker than in *guineensis* sp. n., the fronto-vertex shining, with microsculpture and punctures extremely fine: scrobes and the inter-scrobal prominence shining and almost smooth.

Antenna with scape almost parallel-sided in about apical half, regularly narrowed from before middle to base, where it is very narrow; with pedicellus and flagellum much as described for *guineensis* sp. n., but club perhaps a little less swollen.

Dorsum of thorax with reticulation very fine, and beset with punctures that are very fine, mostly separated by well over twice their own diameters.

Fore wings with marginal vein about twice as long as radial, and postmarginal about as long as marginal.

Head, thorax and propodeum as described for *guineensis* sp. n., but sides of propodeum a bright purple. Gaster blue-green, reddish purple and bright bronzy, the first large tergite mainly blue-green. Antennal coloration much as described for *guineensis* sp. n., but the brighter colour on scape and pedicellus less distinct. Leg colour as in *guineensis* sp. n. except that the hind tibiae are rather narrowly pale at apex.

Holotype ♀. SOUTH AFRICA: Cape Province, 1924–5, “Rust’s no. L2”. This number refers to specimens obtained by E. W. Rust in various localities in the Cape Province and recorded as reared from *Baccacoccus* sp. and *Saissetia* spp.: H. Compere suspects, however, that they issued from overlooked mealybugs (*Pseudococcinae*).

Paratypes. SOUTH AFRICA, 3 ♀, same data as holotype; Transvaal, Pienaarspoort 1 ♀, ii.1954, 2 ♀, v.1955, *ex* Diaspine scale, (*E. C. G. Bedford*). ERITREA: Asmara, 1 ♀, 19.iv.1930 on *Acacia cyanophylla*, Eztalesan, 1 ♀, 11.v.1930 on *Croton macrostachys*, Cheren, 1 ♀, 15.iv.1930 (*H. Compere*).

Holotype in British Museum (Natural History); paratypes in British Museum (Natural History), in Citrus Experiment Station, Riverside, in Department of Agriculture, Pretoria and in Coryndon Museum, Nairobi.

Clausenia confusor sp. n.

(Text-fig. 40)

Head from above very similar in proportion to that of *purpurea* Ishii; in side view (Text-fig. 40) with cheeks sharply narrowed to mouth; in facial view short, with cheeks narrowed at more than half a right angle: scrobes moderately impressed. Eyes just distinctly hairy $\times 45$. Head sculpture much as in *guineensis* sp. n.

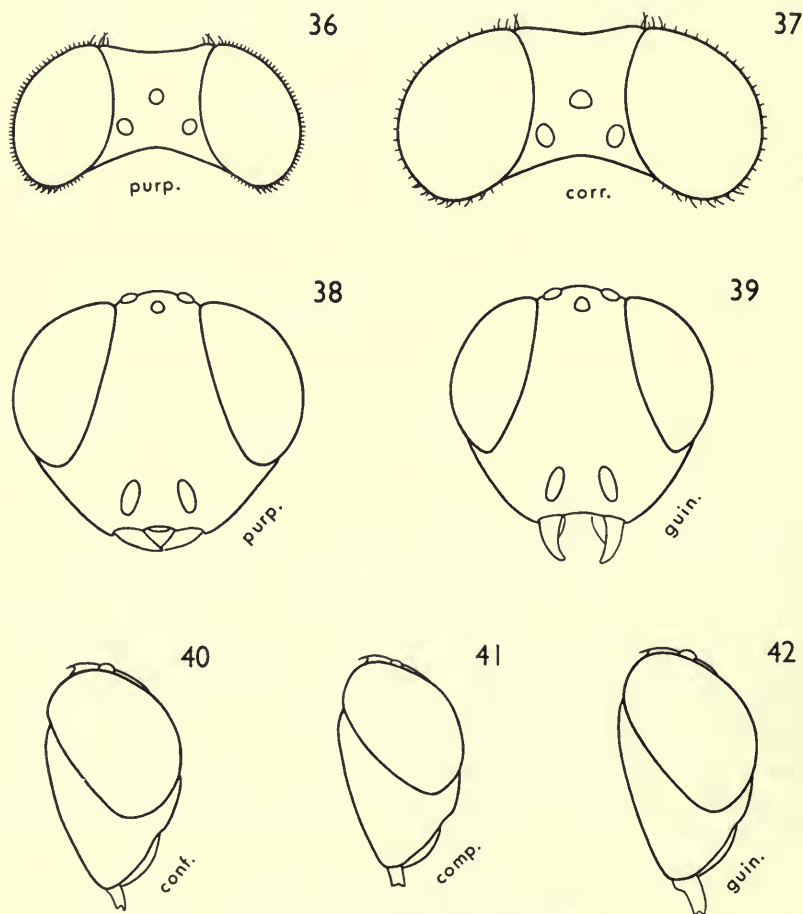
Antenna with scape as described for *purpurea* Ishii ; with pedicellus relatively shorter than in that species : flagellum altogether relatively short and stout : funicle segments 5 and 6 only one and a quarter times as long as broad : club considerably stouter than sixth funicle segment, with first suture at about a right angle to the axis, and second not very strongly curved or oblique, not nearly obliterating the margin of the second segment.

Mesoscutum very finely reticulate, irregularly beset with piliferous punctures that are separated by about their own diameters : scutellum very finely and sparsely punctate, very finely alutaceous and shining.

Fore wings with marginal vein about as long as postmarginal, and almost twice length of radial.

Gaster much shorter than thorax : apical sternite semitruncated and notched in the middle.

Head, thorax and propodeum brownish black or blackish brown with metallic reflections : mesoscutum and scutellum blue-green, with a greater or lesser infusion of reddish purple, or sometimes in part bright bronzy (the purple appearing the more dominant the less the back-



FIGS. 36-42. *Clausenia* species. 36-37. Head, seen from above of 36, *C. purpurea* Ishii and 37, *C. corrugata* sp. n. 38-39. Head, in facial view of 38, *C. purpurea* Ishii and 39, *C. guineensis* sp. n. 40-42. Head, in dextro-lateral view, of 40, *C. confusor* sp. n. ; 41, *C. comperei* sp. n. and 42, *C. guineensis* sp. n.

ground colour is high-lighted): sides of propodeum greenish, purplish or bronzy. Gaster blue-green, reddish purple and bright bronzy above, much duller below. Antennae having scape blue-green to blue, with infusion of reddish purple, and pedicellus and flagellum blackish brown, with weak metallic reflections. Leg colour as in *guineensis* sp. n., but hind tibiae varying from only moderately darkened in about basal half above to only rather narrowly pale at apex.

Male: head, dorsum of thorax and gaster, and sides of propodeum with bright metallic reflections on a mostly dark green background; antennae similar but, except sometimes for scape, more weakly coloured; pleura, propodeum above, coxae except at apex, and femora and tibiae more or less broadly in middle, similar but still more weakly so; legs otherwise stramineous to pale testaceous.

Holotype ♀. GHANA, Tafo, 9.iii.1950, *ex Planococcoides njalensis* (Laing), (R. G. Donald).

Paratypes. GHANA: Tafo, 2 ♀, 2 ♂, 1947, 1 ♂, ii.1949, 4 ♀, xi.1949, Oyoko, 3 ♀, iii.1950, Bunsu, 3 ♀, iv.1950, Adonkwanta, 2 ♀, 13.iii.1950, all *ex Planococcoides njalensis* (Laing) (A. H. Strickland, R. G. Donald or F. E. Decker); Akwadum, 1 ♀, 1 ♂, 30.iii.1951, Tafo, 2 ♂, 30.iv.1954 (F. E. Decker). NIGERIA: Ibadan Province, Idiaunre, 3 ♀, 7.i, 6 ♀, 28.ix.1954, *ex Planococcoides njalensis* (Laing) on *Theobroma cacao*, Benin Province, Ugbogiobo, 2 ♂, 15.v.1954, *ex Planococcus citri* (Risso) on *Theobroma cacao*, Abeokuta Province, Ilaro, 1 ♂, 26.i.1954, *ex Pseudococcine* nymph on *Theobroma cacao* (all R. G. Donald).

Holotype in British Museum (Natural History); paratypes in British Museum (Natural History), in U.S. National Museum, in Citrus Experiment Station, Riverside, in Australian National Collection, in Národní Museum, Prague, in West African Cacao Research Institute, in Coryndon Museum, Nairobi, and in Department of Agriculture, Pretoria.

KEY TO SPECIES OF *CLAUSENIA* ISHII : FEMALES

- 1 Gaster much shorter than thorax: hypopygium semitruncated and notched in the middle, scarcely boat-shaped: [antennal club with second suture not strongly curved or oblique: frontovertex shining, with reticulate microsculpture very fine and punctation sparse]: Africa *confusor* sp. n.
- Gaster not much shorter than thorax: hypopygium boat-shaped, pointed at apex 2
- 2 Antennae having funicle segments 5 and 6 only a little longer than broad: frontovertex more strongly sculptured, hardly shining (see couplet 3): eyes strongly or rather strongly hairy (Text-figs. 36–37): [mesoscutum beset with punctures of moderate strength] 3
- Antennae having sixth funicle segment about one and a half times as long as broad and fifth still longer: frontovertex more shining, with reticulate microsculpture very fine and punctation sparse: eyes moderately or weakly hairy 4
- 3 Head from above less broad (Text-fig. 36), and in side view with cheeks not sharply narrowed to mouth: frontovertex not having transverse corrugations: mesoscutum more densely punctate: marginal vein of fore wing only moderately longer than radial: head usually dominantly dark green: antennal scape pale testaceous, usually darkened above: Asia, introduced to U.S.A. *purpurea* Ishii
- Head from above broader (Text-fig. 37), and in side view with cheeks sharply narrowed to mouth: frontovertex having weak but distinct transverse corrugations between median ocellus and top of scrobal impression: mesoscutum less densely punctate: marginal vein of fore wing almost twice length of radial: head not dominantly dark green: antennal scape blackish brown with metallic reflections, not testaceous beneath: West Africa *corrugata* sp. n.

- 4 As in the two preceding species, second suture of antennal club strongly oblique and curved, leaving the lower margin of the second club segment very short (especially apparent on inner side), and also head in facial view shorter (cf. Text-fig. 38): fore wings with marginal vein widened to apex, only slightly longer than radial: eyes moderately hairy, just distinctly so $\times 25$; Israel *josefi* Rosen
- Antennae having second suture of club rather strongly oblique yet leaving the lower margin of the second club segment more than half length of upper: head in facial view longer (e.g. Text-fig. 39): fore wings with marginal vein parallel-sided, almost or quite twice length of radial: eyes more weakly hairy: Africa 5
- 5 Head in side view (Text-fig. 42) with cheeks not sharply narrowed to mouth: punctures on mesoscutum not very fine, many separated by less than twice their own diameters: hind tibiae usually mainly pale, darkened above, but if more extensively darkened then at least broadly pale at apex: West Africa *guineensis* sp. n.
- Head in side view (Text-fig. 41) with cheeks rather sharply narrowed to mouth: punctures on mesoscutum very fine, mostly separated by well over twice their own diameters: hind tibiae only rather narrowly pale at apex: South Africa, Eritrea *comperei* sp. n.

Species incorrectly placed in *Clausenia* Ishii

Clausenia saissetiae Yasumatsu & Yoshimura, 1945, *Mushi*, **16**: 31-32.

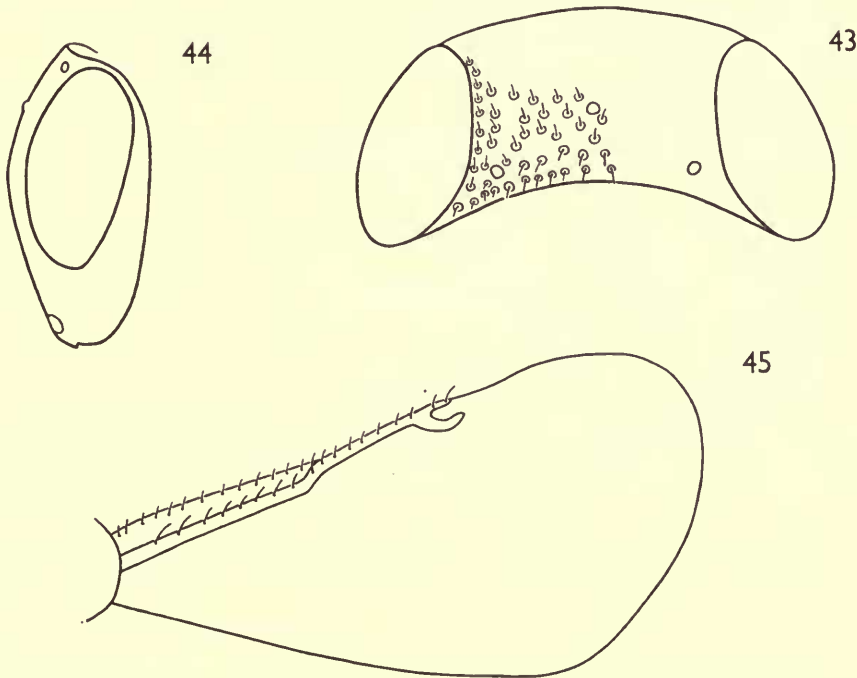
Those authors stated that the position of this species within the genus was anomalous. The species is treated in the present work below (p. 226).

AENASIINA

KEY TO GENERA OF THE AENASIINA: FEMALES

- 1 Head, seen from above, menisciform: frontovertex relatively broad, at narrowest about twice as broad as an eye; covered with coarse, umbilicate, contrastingly-coloured punctures that are well-separated above, at least beside the interocellar area, but become more reticulate near the malar groove, to which they extend (Text-fig. 43): head in side view regularly rounded down to mouth, with facial impression weak or virtually absent (Text-fig. 44): mesoscutum relatively short, hardly more than half the length of the scutellum: costal cell bearing a single row of hairs on both upper and under surface, rarely with a few other hairs near apex (Text-fig. 45): [antennal scape never more than slightly dilated below] 2
- Head, seen from above, not or hardly menisciform: frontovertex at narrowest never more than slightly broader than an eye, usually much narrower; its punctuation various but if coarse, then almost wholly closely reticulate above (e.g. Text-fig. 55): head in side view not so regularly rounded, with facial impression always more or less large and strong (Text-figs. 61-66 and 109-110): mesoscutum relatively longer, always much more than half the length of the scutellum 3
- 2 Facial impression virtually absent, not reaching lower level of eyes, the ill-defined scrobes shorter than the toruli: antennal scape, except in Australian species, almost cylindrical, very slender and elongate: costal cell sub-parallel to apex, the wing margin, except in Australian species, very little emarginate there: marginal vein several times as long as broad, much longer than postmarginal and radial (Text-fig. 45): southern Europe, Africa, Australia *METAPHAENODISCUS* Mercet
- Facial impression weak but distinct, reaching well above lower level of eyes, the scrobes quite distinct, much longer than the toruli: antennal scape slightly but distinctly dilated below, much less elongate (Text-figs. 46-48): wing margin emarginate at apex of costal cell: marginal vein not or hardly twice as long as broad, much shorter than postmarginal and radial (Text-figs. 49-50): America and Africa *CHALCASPIIS* Howard

- 3 Frontovortex of moderate breadth, one-third to one-sixth the total head breadth; covered, except near occiput, with coarse, umbilicate punctures, which are wholly or almost wholly reticulate, especially just above facial impression (Text-figs. 54-58 and 67-68): punctures that are at least moderately coarse descend at least some way between eyes and facial impression: [venation not as in *Neodiscodes*, see below] 4
- Frontovortex nearly always less than one-sixth the total head breadth [but cf. venation of *Neodiscodes*: punctuation shallow to moderate, frequently in large part, but usually not almost wholly, reticulate (Text-figs. 94-95): none but fine punctures descend between eyes and facial impression] 5
- 4 Postmarginal vein not, or not very much, longer than radial (Compere, 1937, fig. 3): reticulate punctuation descending at least some of the way between eyes and facial impression (Text-figs. 65-66 and 83-87): a large group of species has the female antennal scape strongly dilated below **AENASIUS** Walker
- Postmarginal vein very much longer than radial (Text-fig. 89): reticulate punctuation reaching top of facial impression but stopping short there, the punctures descending between eye and facial impression being scattered, shallower, and only moderately coarse (Text-figs. 90-91): female antennal scape not strongly dilated below **BLEPYRUS** Howard
- 5 Antennal scape (female) strongly dilated below, 2 to $2\frac{1}{2}$ times length of its greatest breadth (Compere, 1931, fig. 3e): postmarginal and radial veins both rather long, the postmarginal slightly the longer, the radial emitted at a very acute angle with it (Text-figs. 96-98): frontovortex with punctuation rather coarse and deep, stronger before than behind median ocellus, and often in large part reticulate (Text-figs. 94-95): scutellum, except at sides, about as shining as the mesoscutum: Africa and Asia **NEODISCODES** Compere



FIGS. 43-45. *Metaphaenodiscus* species, females. 43, *M. nemoralis* Mercet head, seen from above; 44, the same, in sinistrolateral view; 45, right fore wing of African species.

Antennal scape (female) weakly dilated below, $3\frac{1}{2}$ to $6\frac{1}{2}$ times length of its greatest breadth (Text-figs. 106–108): postmarginal vein generally considerably longer than radial, the latter emitted at a less acute angle with it and also relatively shorter than in alternate (Text-figs. 111–112): frontovertex with punctation shallow to moderate, stronger behind than before median ocellus, and seldom reticulate: scutellum generally decidedly less shining than the mesoscutum: America

EURYRHOPALUS Howard

METAPHAENODISCUS Mercet, 1921

(Text-figs. 43–45)

1921 *Metaphaenodiscus* Mercet, *Trab. Mus. nac. Cienc. nat., Madr.*: 59, 60–64, 626–9.

Material of this genus is not adequate for a revision, but the diagnosis of two undescribed species will give further information on the distribution and range of structure. The Australian species is clearly the most nearly related to the next genus, *Chalcaspis* Howard.

DIAGNOSES OF THE SPECIES OF *METAPHAENODISCUS* MERCET: FEMALES

- A. Antennal scape very slender and elongate, almost cylindrical: all funicle segments distinctly longer than broad: club suddenly expanded from funicle, about four-fifths length of combined funicle segments.

Mesoscutum closely reticulate-punctate: scutellum rather loosely so.

Spiracles of propodeum moderately large, clearly transverse, and clearly less than their shorter diameter from both anterior margin and declivity.

Fore wings strongly infusate.

SPAIN: (see Mercet, 1921) ***nemoralis*** Mercet

Material in Instituto Español de Entomología, Madrid.

- B. Antennal scape as described for *nemoralis* Mercet: all funicle segments, except the first, distinctly broader than long: club not suddenly expanded from funicle, about equal in length to pedicellus and all funicle segments combined.

Mesoscutum very loosely reticulate-punctate: scutellum with piliferous punctures, except at sides, well separated.

Spiracles of propodeum small, weakly transverse, clearly further than their longitudinal diameter from both anterior margin and declivity.

Fore wings strongly infusate.

SOUTH AFRICA: Transvaal, (*D. P. Annecke*) sp.

Material in Plant Protection Research Institute, Pretoria.

- C. Antennal scape slightly but distinctly dilated below, five times length of its greatest breadth (rather similar to that of *Chalcaspis lucidus* sp. n., Text-fig. 46): first funicle segment slightly, the remainder distinctly, transverse: club not suddenly expanded from funicle, a little shorter than pedicellus and all funicle segments combined.

Mesoscutum rather loosely reticulate-punctate: scutellum with punctures sharply marked but relatively shallow, many almost contiguous in transverse though much further separated in longitudinal direction.

Spiracles of propodeum almost circular, about their own diameter from both anterior margin and declivity.

Fore wings moderately infusate in about basal two-fifths, beyond that weakly so.

AUSTRALIA: Queensland, S.E., (*R. E. Turner*) sp.

Material in British Museum (Natural History).

CHALCASPIIS Howard, 1895

1895 *Chalcaspis* Howard, *Proc. U.S. natn. Mus.* **17** : 606.

1915 *Chalcaspis* Howard; Girault, *Ann. ent. Soc. Am.* **8** : 280.

Three species of this genus were previously known, all occurring in the U.S.A. Dr. B. D. Burks has kindly compared the types of all three, which are located in Washington, with specimens I had studied, having at hand typescript copies of my descriptions and keys, and photocopies of my figures. A new species from the Caribbean is now described.

Two species have been received from southern Africa, each in a single specimen caught in a trap. They have in common several characters by which they differ from the American species. In this paper they are diagnosed but not validated. The specimens are located in the Plant Protection Research Institute, Pretoria.

***Chalcaspis lucidus* sp. n.**

(Text-figs. 46, 51)

Frontovertex shining, with reticulate microsculpture extremely fine, just comfortably discernible $\times 65$; with orbital piliferous punctures conspicuous, separated by about their own diameters, and punctures near median ocellus well separated by about their own diameters.

Antenna with scape (Text-fig. 46) over $5\frac{1}{2}$ times length of its greatest breadth, very slightly expanded below to about middle, almost parallel-sided beyond this; with pedicellus twice length of its greatest breadth; with funicle segments short cup-shaped to short cylindrical, the sixth one and a half times as broad as long, and club one and a quarter times length of combined funicle segments.

Mesoscutum with reticulate microsculpture fine, beset with rather shallow piliferous punctures that mostly are separated by rather more than their own diameters: axillae and scutellum similarly shining and with fine reticulate microsculpture, beset with shallow piliferous punctures that mostly are separated by considerably more than their own diameters (Text-fig. 51).

Fore wings with fore margin moderately emarginate at apex of costal cell and beyond postmarginal: radial and postmarginal stouter than in *pergandei* How., extending the same distance to the narrow hyaline streak: radius almost rectilinear before the decidedly broadened stigma.

Head coppery, with punctures and sometimes also the scrobal impressions bright brassy green. Dorsum of thorax and sides of propodeum brassy green with infusions of coppery which, in the type, are strong on mesoscutum. Pleura and propodeum above dull green: gaster green with infusions of coppery to brassy. Antennae with scape a bright testaceous; with pedicellus pale castaneous; with flagellum a pale testaceous, the club darkened to pale, dull brown in about apical half or almost to base. Legs mainly a bright testaceous, the tarsi paler, but dark at apex: coxae dull green, and femora and mid tibiae to some extent from base infuscate with metallic reflection.

Holotype ♀. CUBA: Rio Cauto, 21.xi.1930, ex *Phenacoccus solani* (Ferris), "C.S.C. Ent. no. 5119".

Paratype: 1 ♀ (same data as holotype).

Holotype in U.S. National Museum, paratype in British Museum (Natural History).

Chalcaspis pergandei Howard

(Text-figs. 47, 50, 52)

1895 *Chalcaspis pergandei* Howard, *Proc. U.S. natn. Mus.* **17**: 606-7.

Frontovertex shining, with reticulate microsculpture extremely fine, just comfortably discernible $\times 65$; with orbital piliferous punctures large, separated by less than their own diameters, and punctures near median ocellus in a loose reticulation.

Antenna with scape (Text-fig. 47) nearly five times length of its greatest breadth, expanded to about two-fifths its length, then almost parallel-sided; with pedicellus twice length of its greatest breadth; with funicle segments short cup-shaped to short cylindrical, the sixth nearly twice as broad as long, and club about one-third longer than combined funicle segments.

Mesoscutum, axillae and scutellum rather dull, with reticulate microsculpture rather fine to moderate, beset with coarse piliferous punctures that are almost in a loose reticulation (Text-fig. 52).

Fore wings (Text-fig. 50) with fore margin moderately emarginate at apex of costal cell, rather strongly emarginate beyond postmarginal: radial and postmarginal relatively slender, extending the same distance to the broad hyaline streak: radius decidedly curved and with stigma scarcely broadened.

Head coppery, with punctures, marginal parts and mouth region bright brassy green. Dorsum of thorax and sides of propodeum a fundamental brassy green, with infusions of coppery to brassy. Pleura and propodeum above steely green; gaster a much brighter green, with strong brassy to coppery reflections. Antennae having scape a dull testaceous, narrowly dark-marked on upper and lower margins; having pedicellus blackish, with metallic reflections; having funicle pale testaceous, the basal segments considerably darkened, and club dull brown with weak metallic reflections. Leg coloration much as described for *lucidus* sp. n., but the testaceous colouring duller and the infuscation more extensive.

Redescribed from the following: U.S.A.: Arizona, Sabino Co., 1 ♀, 14.iii.1937 (*R. A. Fleck*); New Mexico, 13½ m. N. of Roswell, 1 ♀, 21.viii.1929 on *L. alyssoides* (*V. E. Romney*); Texas, Brown Co., 1 ♀, 12.vii.1937 on peach (ref. T 5344), Bangs, 1 ♀, 18.viii.1937 on peach (*Christenson & Jones*) (ref. C 3269); Kansas, Onaga, 1 ♀, Crevecoeur; Nebraska, Halsey, 1 ♀, 6.viii.1958 (*H. Henzlik*). Material in U.S. National Museum and in British Museum (Natural History).

Chalcaspis arizonensis Girault

(Text-fig. 48)

1915 *Chalcaspis arizonensis* Girault, *Ann. ent. Soc. Am.* **8**: 280.

Frontovertex less shining than in *pergandei* How. and *lucidus* sp. n., with reticulate microsculpture extremely fine yet more outstanding than in those species; with orbital piliferous punctures large, separated by less than their own diameters, and punctures near median ocellus and on inter-ocular area in a loose reticulation.

Antenna with scape (Text-fig. 48) over four times length of its greatest breadth, broadest about in middle, almost parallel-sided beyond this, with upper margin markedly bowed downward before middle; with pedicellus long-necked then strongly expanded, twice length of its greatest breadth; with funicle segments short-cylindrical, the sixth one and a half times as broad as long, and club one and a quarter times length of combined funicle segments.

Mesoscutum with reticulate microsculpture rather fine, beset with piliferous punctures of moderate depth that mostly are separated by much less than their own diameters: axillae and scutellum dull, with reticulate microsculpture regular and of moderate strength, beset with piliferous punctures that are smaller and shallower but denser.

Fore wings with fore margin moderately emarginate at apex of costal cell and beyond postmarginal: radial and postmarginal stouter than in *pergandei* How., the radial the stouter: radius rather strongly curved and with stigma scarcely broadened, extending very slightly beyond postmarginal, but the broad hyaline streak is perpendicular to the wing margin.

Head coppery, with punctures and marginal parts a more or less bright brassy green. Dorsum of thorax and sides of propodeum dull blue-green, mainly overspread with infusions of dull bronzy. Pleura and propodeum above steely green; gaster a brighter green, with weak, mostly brassy, infusions. Antennal coloration as described for *pergandei* How., but the scape and basal funicle segments not always dark-marked. Legs having coxae steely green; having femora and tibiae dull brown overspread to some extent, often mainly, with infuscation which has metallic reflection, the tibiae and sometimes femora paler at apex: tarsi stramineous, a little darkened at apex.

Redescribed from the following. U.S.A.: Arizona, Phoenix, 2 ♀, 16.vii.1943, ex *Phenacoccus solenopsis* Tinsley (R. Fleck) (Lot no. 43. 8395); Utah, St. George, 1 ♀, 15.iv.1930 on *Salsola pestifer* (D. E. Fox); Idaho, Burley, 1 ♀, 16.ix.1930 on *Salsola pestifer*, 1 ♀, 13.x.1932 in wind vane trap (P. N. Annand); Texas, Brownwood, 1 ♀, 26.viii.1937 on peach (Christensen & Jones) (ref. c 3776); Missouri, Maplewood, "mealybug parasite issued by 4.ix.30" (Satterthwait) (Webster Grvs. no. 30276). Material in U.S. National Museum and in British Museum (Natural History).

Chalcaspis phenacocci (Ashmead)

(Text-fig. 53)

1902 *Blepyrus phenacocci* Ashmead, *Can. Ent.* **34**: 301.

1922 *Chalcaspis phenacocci* (Ashmead) Timberlake, *Proc. Hawaii ent. Soc.* **5** (1): 170.

Frontovertex with reticulate microsculpture regular, very fine, very comfortably discernible $\times 65$; with orbital piliferous punctures small, separated by about their own diameters, and punctures near median ocellus relatively small, well separated.

Antenna with scape over five times length of its greatest breadth, slightly expanded to about middle, almost parallel-sided beyond this; with pedicellus over two and a half times length of its greatest breadth; with funicle segments cup-shaped to cylindrical, the sixth one and a third times as broad as long, and club one-third longer than combined funicle segments.

Mesoscutum with reticulate microsculpture rather fine, beset with rather sharp piliferous punctures that are separated by rather less to rather more than their own diameters; axillae and scutellum rather dull, with reticulate microsculpture of moderate strength, beset with piliferous punctures that are smaller and denser, mostly separated by less than their own diameters, and not so shallow as in *arizonensis* Grlt. (Text-fig. 53).

Fore wing with fore margin moderately emarginate at apex of costal cell, very weakly emarginate beyond postmarginal: radial and postmarginal stouter than in *pergandei* How.: radius decidedly curved and with stigma scarcely broadened, extending not quite as far as tip of postmarginal, the rather narrow hyaline streak sloping outward to the wing margin.

Head coppery, with punctures and marginal parts brassy green. Dorsum of thorax dull blue-green, with indefinite bright to dull bronzy reflections. Pleura and propodeum above steely blue to green: gaster a brighter blue-green, with moderate brassy to coppery reflections. Antennae having scape and funicle a more or less dull testaceous with dark marking; and having pedicellus blackish and club dull brown, both with metallic reflections. Leg coloration much as described for *arizonensis* Grlt., but the tarsi often extensively darkened at apex.

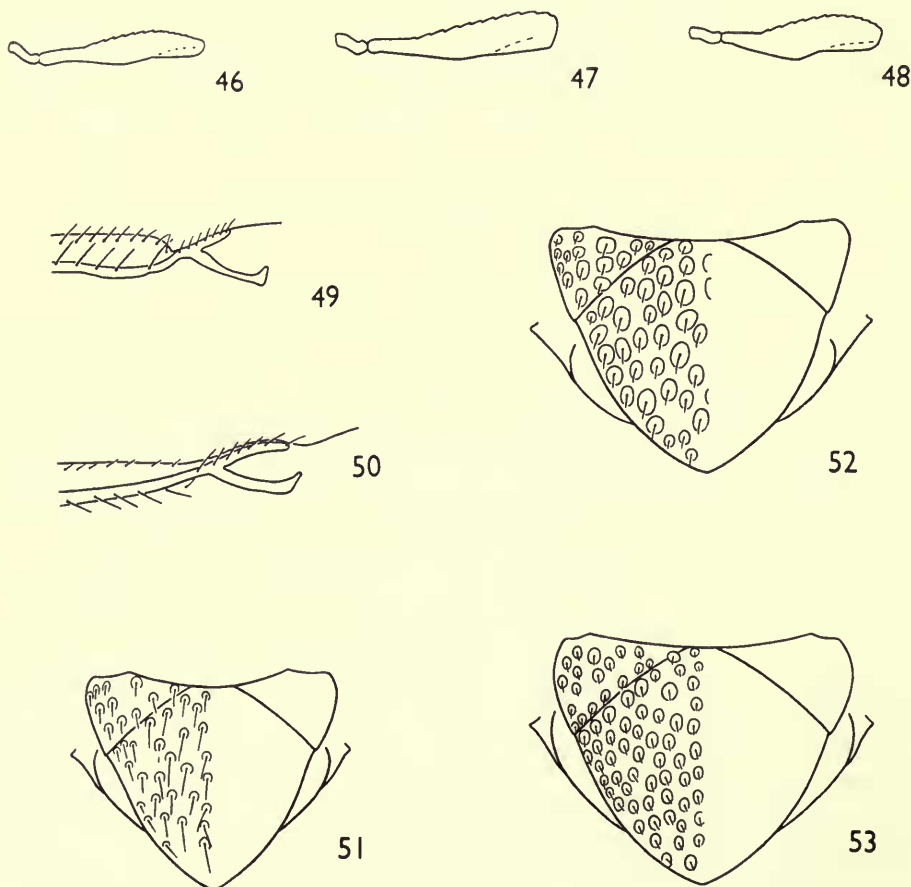
Redescribed from the following. U.S.A.: California, Rialto, 1 ♀, vi.1934, ex *Phenacoccus solani* Ferris (Jourbert), Riverside, 1 ♀, viii.1935, ex *P. solani* (J. D. Maple), Fontana, 1 ♀, 1953, ex *P. solani* (Commonwealth Inst. Biol. Control);

Colorado, Rocky Ford, 1 ♀, 20.viii.1909, "bred from Syrphid" (*H. O. Marsh*), Texas, Roma, 1 ♀, 23.x.1950 (*T. P. Chapman*). Material in U.S. National Museum and in British Museum (Natural History).

KEY TO SPECIES OF *CHALCASPIS* HOWARD: FEMALES

- 1 Postmarginal vein very much shorter than radial (Text-fig. 49): hyaline streak absent: marginal and postmarginal contiguous with costal margin: costal cell bearing, on upper surface only, a row of rather large hairs, comparable in size with the larger ones on postmarginal (Text-fig. 49): antennal scape with upper margin bowed downward much more strongly than in *arizonensis* Grt. (cf. Text-fig. 48): antennal club markedly shorter than combined funicle segments: scutellum with piliferous punctures sharply marked and rather large but very shallow: African species .

2



FIGS. 46-53. *Chalcaspis* species, females. 46-48. Right antenna, in dextro-lateral view, of 46, *lucidus* sp. n.; 47, *pergandei* How. and 48, *arizonensis* Grt. 49-50. Part of right fore wing of 49, African species A and 50, *pergandei* How. 51-53. Axillae and scutellum, seen from above, of 51, *lucidus* sp. n.; 52, *pergandei* How. and 53, *phenacocci* (Ashm.).

- Postmarginal and radial veins of similar length (Text-fig. 50): hyaline streak present: marginal and postmarginal not quite contiguous with costal margin: costal cell bearing, on upper and under surfaces, a row of very much smaller hairs (Text-fig. 50): antennal scape bowed downward as in *arizonensis* Grt. (Text-fig. 48) or less strongly: antennal club markedly longer than combined funicle segments: scutellum with piliferous punctures markedly impressed: American species 3
- 2 Mesoscutum rather shallowly yet sharply piliferous-punctate, the punctures mostly separated by less than their own diameters: antennae infusate, with weak metallic reflections: fore wings rather strongly infusate in basal, and moderately so in apical half African species A
- Mesoscutum beset with moderate piliferous punctures that mostly are separated by about their own diameters: antennae with scape and funicle yellow-testaceous, each a little darkened at base: fore wings moderately and more evenly infusate African species B
- 3 Scutellum and axillae decidedly shining, with piliferous punctures relatively shallow, mostly separated by considerably more than their own diameters (Text-fig. 51): fore wings with radius almost rectilinear before the decidedly broadened stigma: Caribbean *lucidus* sp. n.
- Scutellum and axillae much duller and with punctation otherwise: fore wings with radius decidedly curved, the stigma scarcely broadened: U.S.A. 4
- 4 Dorsum of thorax a fundamental brassy green with infusions of coppery to brassy: scutellum and axillae with piliferous punctures large and rather deep, almost in a loose reticulation (Text-fig. 52): fore wing margin rather strongly emarginate beyond postmarginal (Text-fig. 50) *pergandei* Howard
- Dorsum of thorax dull blue-green, with weak bronzy reflections: scutellum and axillae with piliferous punctures relatively much smaller: fore wing margin moderately to weakly emarginate beyond postmarginal 5
- 5 Head with punctures on inter-ocellar area in a loose reticulation: scutellum and axillae with piliferous punctures rather shallow: antennal scape with upper margin markedly bowed downward before middle (Text-fig. 48): fore wing margin moderately but very distinctly emarginate beyond postmarginal: radius extending very slightly beyond postmarginal, the hyaline streak broad, perpendicular to the wing margin *arizonensis* Girault
- Head with punctures on inter-ocellar area well separated: scutellum and axillae (Text-fig. 53) with piliferous punctures deeper: antennal scape with upper margin not markedly bowed downward before middle: fore wing margin very weakly emarginate beyond postmarginal: radius not extending quite as far as tip of postmarginal, the hyaline streak rather narrow, sloping outward to the wing margin *phenacocci* (Ashmead)

AENASIUS Walker, 1846

1846 *Aenasius* Walker, *Ann. Mag. nat. Hist.* (1) **18**: 181.

1937 *Aenasius* Walker; Compere, *Proc. Hawaii. ent. Soc.* **9** (3): 383-8.

Aenasius hyettus Walker

(Text-figs. 54, 59, 69)

1846 *Encyrtus hyettus* Walker, *Ann. Mag. nat. Hist.* (1) **18**: 181 [designated on same page as type-species of *Aenasius* Walker].

Head from above (Text-fig. 54) moderately long, median length about half breadth; fronto-vertex about one-fifth total breadth; in side view rather evenly curved to mouth; in facial view (Text-fig. 59) with cheeks sharply narrowed to mouth: facial impression nearly half height

of head, bordered by a distinct keel above and at sides. Frontovortex with microsculpture very fine, with orbital piliferous punctures distinct but small, and at narrowest with four rows of large punctures, which are relatively shallow, between these.

Mandibles slender, bidentate, the teeth about equal.

Antenna with scape (Text-fig. 69) about three-quarters longer (dorsally) than its greatest breadth, the lamina curving slightly inward from apex; with pedicellus not much longer than apically broad; with funicle segments rather short and broad, the first five saucer-shaped, the club longer than the combined funicle segments. Greatest width of scape 1.3 times narrowest width of frontovortex.

Pronotum, mesoscutum, axillae and scutellum finely reticulate, beset with moderate, shallow, piliferous punctures that mostly are separated by much more than their own diameters.

Fore wings with outer margin distinctly a little curved (i.e. not almost straight as in the species closest related to *caeruleus* Brues), and with anal angle moderately rounded: post-marginal extending almost to level of tip of uncus, the radial rather strongly curved: hyaline streak very distinct but narrow: costal cell bearing three rows of rather strong hairs.

Head blue-green to brassy green, with red-violet weakly on most of frontovortex, but more strongly above and at sides of facial impression, and also at sides of scrobes and across inter-scrobal prominence. Pronotum, mesoscutum, tegulae, axillae and scutellum dull blue-green, with weak bronzy reflections (thus in 19th century specimens, possibly stronger in recent material). Pleura, propodeum and gaster dull brown to brownish black, with moderate metallic reflections. Antennae blackish brown to brownish black, with weak metallic reflections. Legs brownish black, with weak metallic reflections, merging to testaceous brown: mid femora much paler at apex, mid tibiae almost whitish before apex, and mid and hind tarsi whitish except at apex.

Redescribed from the following material. ST. VINCENT: 1 ♀, Lansdown Guilding. GRENADA: windward side, 2 ♀, leeward side, Mount Gay Estate, 1 ♀ (*H. H. Smith*).

Holotype in University Museum, Oxford: two specimens in British Museum (Natural History) and one in U.S. National Museum.

This species is not known from reared material; but male specimens from Grenada, in the British Museum (Natural History) and the U.S. National Museum, from the series determined by L. O. Howard, have the antennae rather much as figured by Compere (1937), though the antennal club is clearly 3-segmented.

Aenasius similis sp. n.

(Text-figs. 61, 70)

1937 *Aenasius hyettus* Walker; Compere, *Proc. Hawaii. ent. Soc.* 9 (3): 388-90, 395-7 [Mis-identification].

Head from above moderately broad, median length to breadth = 1:2.0 to 2.2; frontovortex to total breadth = 1:4.1 to 4.8; in side view (Text-fig. 61) somewhat angled above sides of facial impression; in facial view with cheeks narrowed at about half a right angle: facial impression about four-ninths height of head, bordered by a distinct keel above and at sides. Frontovortex with microsculpture extremely fine, with orbital piliferous punctures scarcely distinct above, and at narrowest with four rows of large, relatively shallow, punctures between them.

Mandibles slender, bidentate, the teeth about equal.

Antenna with scape (Text-fig. 70) about one-half longer (dorsally) than its greatest breadth, the lamina falling almost vertically at apex; with pedicellus about a quarter longer than broad; with funicle segments rather short and broad, the first four saucer-shaped, the club shorter than the combined funicle segments. Greatest width of scape 1.7 times narrowest width of frontovortex.

Pronotum, mesoscutum, axillae and scutellum finely reticulate, shining, regularly beset with rather small to moderate piliferous punctures that are separated by much more than their own diameters.

Fore wings as described for *hyettus* Walker.

Head colour as described for *hyettus* Walker. Pronotum, mesoscutum, tegulae, axillae and scutellum blue-green, with bronzy to red-violet reflections. Pleura, etc. as described for *hyettus* Walker. Antennae brownish black to blackish brown, with weak metallic reflections. Leg colour as described for *hyettus* Walker.

Holotype ♀. PANAMA: Montelirio, iii. 1924 (*D. T. Fullaway*).

Paratypes the following. PANAMA: Montelirio, 1 ♀, v. 1924, 2 ♀, iv. 1924 and 1929, on banana, Barro Colorado, 1 ♀, viii. 1932, on banana, unlocalized, 1 ♀, vii. 1914 (*D. T. Fullaway*); Canal Zone, Paraiso, 1 ♀, 20. iii. 1911 (*E. A. Schwarz*); Canal Zone, Summit, 2 ♀, Aquadulce, 1 ♀, xi. 1946 (*N. L. H. Krauss*). GUATEMALA: 1 ♀, 20. vii. 1934, on banana debris (taken at Philadelphia, U.S.A.). VENEZUELA: San Esteban, 1 ♀, xi. 1939 (*Pablo Anduze*). PERU: Piura, 1 ♀ (reared at South American Parasite Lab.) (*P. A. Berry*).

Holotype in U.S. National Museum: paratypes in U.S. National Museum and in British Museum (Natural History).

Males taken with female specimens on banana in Panama have the antennal club solid. Compere's figure of the male antenna of *hyettus* Walker is most probably to be attributed to this species.

Aenasius maplei Compere

(Text-figs. 55, 62, 71)

1937 *Aenasius maplei* Compere, *Proc. Hawaii. ent. Soc.* 9 (3) : 384, 388-91, 397-8.

Head from above (Text-fig. 55) broad, median length to breadth = 1 : 2.3, with frons rather prominent, and facial impression in this view deep; frontovertex relatively broad, to total breadth about 1 : 3.4, with ocelli in a slightly obtuse triangle (95°); in side view (Text-fig. 62) curved rather evenly to sides of facial impression and then bent round sharply to mouth region; in facial view with cheeks decidedly rounded, sharply narrowed to mouth: facial impression about two-fifths height of head, bordered by distinct keels at sides but not above. Frontovertex with microsculpture of moderate strength, with orbital piliferous punctures very distinct, and at narrowest with four to five rows of coarse punctures between these.

Mandibles slender, bidentate, the upper tooth much the longer and broader.

Antenna with scape (Text-fig. 71) about one-half longer (dorsally) than its greatest breadth, the upper margin rising relatively steeply from base, the lamina bulging outward at apex; with pedicellus not much longer than broad; with first five funicle segments saucer-shaped but the sixth much longer, and club about one-half longer than the combined funicle segments. Greatest width of scape 0.9 to 1.1 times narrowest width of frontovertex.

Pronotum, mesoscutum, axillae and scutellum with reticulate microsculpture regular and strong, beset with piliferous punctures that are separated by about their own diameters and usually are very shallow.

Shape of fore wings as described for *personatus* sp. n. but the wings distinctly less broad. Veins relatively stout: postmarginal clearly not extending to level of tip of uncus, the radial distinctly curved: hyaline streak relatively narrow and with two or three small hairs intruding into it: costal cell bearing four rows of strong hairs.

Head blue-green, with reflections merging from brassy, in region of ocelli, through golden to bronzy; and with weak red-violet coloration beside the facial impression and on genae.

Antennae brownish black to blackish brown, with bright reflections. Pronotum, mesoscutum, tegulae, axillae and scutellum steely green with indefinite bright reflections, more definitely bronzy at sides. Pleura, propodeum and gaster brownish black or paler, with bright reflections. Legs brownish black, merging to dark testaceous-brown, with metallic reflections, the mid tibiae moderately dark: mid and hind tarsi whitish, dark toward apex.

Redescribed from the following material. U.S.A.: California, Fillmore, 4 ♀, 6 and 25.iii.1936, *ex Puto yuccae* (Coq.) (J. D. Maple). Material in U.S. National Museum, Citrus Experiment Station, Riverside, and British Museum (Natural History).

The male has the facial impression bordered above by a sharp fold. The antenna was figured by Compere (1937, p. 384).

*Aenasius personatus*² sp. n.

(Text-figs. 56, 60, 72)

Head from above (Text-fig. 56) moderately broad, median length to breadth about 1:2.1; frontovertex to total breadth about 1:4.5; in side view curved evenly above, and then bent round sharply to mouth region; in facial view (Text-fig. 60) with cheeks narrowed to mouth at about half a right angle: facial impression about one-third height of head, not distinctly keeled on upper margin but sharply so at sides: eyes less strongly divergent than in *hyettus* Walker. Frontovertex with reticulate microsculpture regular and of moderate strength, with orbital piliferous punctures moderate, and at narrowest with four rows of coarse punctures between these.

Mandibles slender, bidentate, the upper tooth longer and rather broader.

Antenna with scape (Text-fig. 72) about one-third longer (dorsally) than its greatest breadth, the lamina bulging outward at apex; with pedicellus scarcely longer than broad; with first five funicle segments saucer-shaped, the sixth decidedly longer, and club about one-half longer than the combined funicle segments. Greatest width of scape 1.8 times narrowest width of frontovertex.

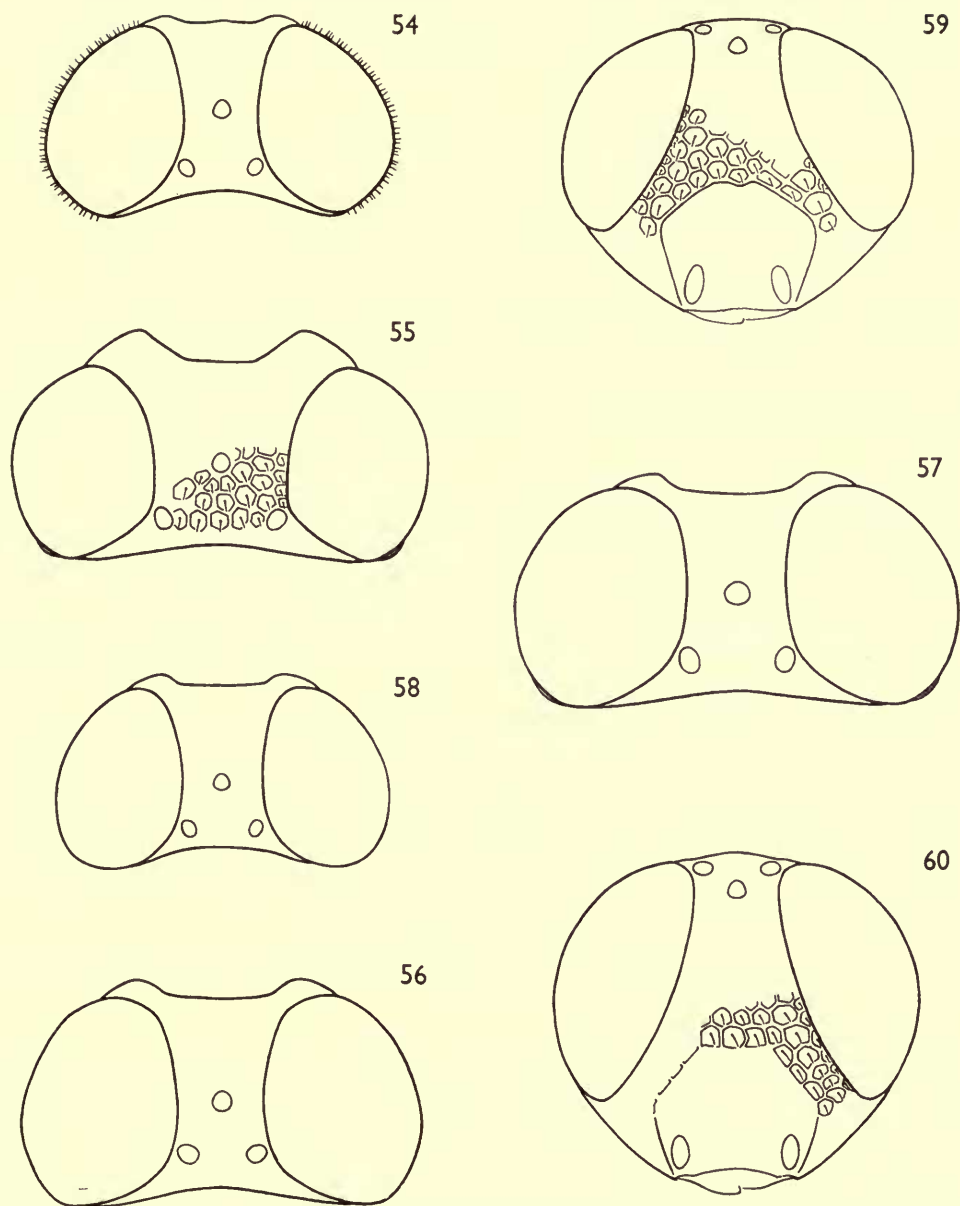
Pronotum, mesoscutum, axillae and scutellum very finely reticulate, beset with shallow piliferous punctures that mostly are separated by about or rather more than their own diameters.

Fore wings with lower part of outer margin almost straight and with anal angle relatively sharp: postmarginal clearly not extending to level of tip of uncus, the radial slightly curved: hyaline streak present: costal cell bearing four or sometimes three, rows of rather strong hairs.

Head, for the most part, red-violet and blue-green, or sometimes almost blue: these colours vary in proportion, but generally the violet is on the ridges of the reticulations and in a band above the toruli, and the green in the punctures and on the less heavily sculptured parts: mouth region often more brassy. Pronotum, mesoscutum, tegulae, axillae and scutellum blue-green with strong red-violet reflection. Pleura, propodeum and gaster brownish black with pale metallic reflections, the gaster beneath and propodeum above paler, the propodeum in region of spiracles with brighter coloured reflections. Antennae brownish black, overspread with bright pale bronzy reflection. Legs brownish black, with weak metallic reflections, merging to testaceous-brown, the mid tibiae palest: mid metatarsi, except at apex, and first three hind tarsal segments, whitish.

Holotype ♀. U.S.A.: Florida, Hialeah, 24.viii.1953, on *Hibiscus tiliaceus* (O. D. Link).

² Etym. "masked", also the "masquerader".



FIGS. 54-60. *Aenasius* species, females. Head, seen from above, of 54, *Aen. hyettus* Walker; 55, *Aen. maplei* Comp.; 56, *Aen. personatus* sp. n.; 57, *Aen. caeruleus* Brues and 58, *Aen. mastii* Domen. Head, in facial view, of 59, *hyettus* Walk. and 60, *personatus* sp. n.

Paratypes the following. U.S.A.: 4 ♀ (same data as holotype). TRINIDAD: I.C.T.A., 1 ♀, v.1952, 1 ♀, vi.1953, 14 ♀, 6.ix.1953, *ex Ferrisia virgata* (Ckll.) on cacao, 2 ♀, ix.1953, San Juan, 1 ♀, 5.xi.1953, *ex Ferrisia* on *Gliricidia* (F. D. Bennett).

Holotype in U.S. National Museum: paratypes in U.S.N.M., Citrus Experiment Station, Riverside, Imperial College of Tropical Agriculture and British Museum (Natural History).

Aenasius caeruleus Brues

(Text-fig. 57)

1910 *Aenasius caeruleus* Brues, *Bull. Am. Mus. nat. Hist.* **28** : 84-85.

1937 *Aenasius caeruleus* Brues; Compere, *Proc. Hawaii. ent. Soc.* **9** (3) : 388-90, 395.

Head from above (Text-fig. 57) decidedly broad, median length to breadth = 1 : 2.2 to 2.4 ; frontovertex to total breadth = 1 : 4.2 to 4.9 : in side view curved almost evenly to mouth : in facial view with cheeks narrowed to mouth at more than half a right angle : facial impression relatively shallow, about two-fifths height of head, not distinctly keeled on upper margin but sharply so at sides. Frontovertex with microsculpture regular and of moderate strength, with orbital piliferous punctures moderate, at narrowest with four rows of coarse punctures between them.

Mandibles conspicuous, bidentate,³ the smaller lower tooth sharply ridged below.

Antenna with scape three-fifths longer (dorsally) than its greatest breadth, the lamina bulging outward at apex ; with pedicellus about one-third longer than broad ; with funicle segments very short and broad, saucer-shaped, and club about one-half longer than combined funicle segments. Greatest width of scape $1\frac{1}{2}$ times narrowest width of frontovertex.

Pronotum, mesoscutum, axillae and scutellum with reticulate microsculpture rather fine, beset with rather shallow piliferous punctures that mostly are separated by less than their own diameters.

Fore wings as described for *personatus* sp. n.

The colour of the type and one other specimen may be described as follows : head for the most part red-violet and peacock blue, with bronzy reflections above the facial impression, and with blue-green coloration in region of malar space and on inter-scoral prominence. Pronotum, mesoscutum, tegulae, axillae and scutellum red-violet and bronzy, with streaks and patches of blue-green. Pleura and propodeum pale brown with metallic reflections mostly very weak, strong and bright in region of propodeal spiracles : gaster blackish with strong metallic reflections. Antennae brownish black to blackish brown, with weak, mostly pale bronzy, reflections. Leg colour as described for *regularis* sp. n.

Four other specimens differ as follows : head and thorax above dominantly a very blue-green, sometimes brassy green in region of ocelli, with much red-violet, especially beside facial impression and on scutum and scutellum.

Redescribed from the following material. MEXICO: Vera Cruz, Santa Rosa, La Buena Ventura, 1 ♀, 13.vii (holotype) (*A. Petrunkevitch*). PORTO RICO: Mayaguez, on coffee, 1 ♀, 23.iv.1936 (*M. R. Smith*). PANAMA, Canal Zone, Paraiso, 2 ♀, 6.ii.1911 (*E. A. Schwarz*). VENEZUELA: Barinas, 1 ♀, i.1943 (*P. Anduze*). URUGUAY: Montevideo, S. Amer. Parasite Lab., 1 ♀, 31.vii.1942 (*P. A. Berry*).

Holotype in American Museum of Natural History, other specimens in U.S. National Museum and in British Museum (Natural History).

³ Brues described the mandibles as having three teeth, but I believe him to have been mistaken. The mandibles are piliferous and have, on the upper surface (i.e. nearest the clypeus) a few smaller hairs which, according to the angle of viewing, can create the impression of a minute, set-back, uppermost tooth.

Aenasius regularis sp. n.

(Text-fig. 73)

Head from above broad, mostly a little broader than in *personatus* sp. n. and in well developed specimens sharply menisciform; median length to breadth = 1 : 2.0 to 2.1; frontovertex to total breadth about 1 : 4.3 : in side view curved evenly above, then bent round, but not sharply, to mouth region; in facial view with cheeks rather sharply narrowed to mouth : facial impression about one-third height of head, not distinctly keeled on upper margin though sharply so at sides. Frontovertex with microsculpture regular, rather fine; with orbital piliferous punctures moderate; at narrowest with four rows of coarse punctures between these.

Mandibles slender, bidentate, the upper tooth rather the broader.

Antenna with scape (Text-fig. 73) about three-fifths longer (dorsally) than its greatest breadth, the lamina bulging outward at apex; with pedicellus about one-half longer than broad; with funicle segments very short and broad, saucer-shaped, the club nearly twice as long as the combined funicle segments. Greatest width of scape $1\frac{1}{2}$ times narrowest width of frontovertex.

Pronotum, mesoscutum, axillae and scutellum with reticulate microsculpture regular and of moderate strength, regularly beset with rather small and ill-defined piliferous punctures that are separated by much more than their own diameters.

Shape of fore wings as described for *personatus* sp. n. : postmarginal extending very nearly to level of tip of uncus, the radial distinctly curved : costal cell bearing only two rows of strong hairs, the remaining hairs much smaller.

Head blue-green, bronzy on ridges of reticulations, and with red-violet coloration on genae and in a band above the toruli. Pronotum, mesoscutum, tegulae, axillae and scutellum dull blue-green, with bright bronzy, or in part red-violet, reflections. Pleura, etc. as described for *personatus* sp. n. Antennae brownish black, with weak metallic reflections. Leg colour as described for *personatus* sp. n., but the hind tarsi a little darkened above.

Holotype ♀. TRINIDAD: I.C.T.A., iv. 1952, ex *Ferrisia virgata* (Ckll.) on cacao (*F. D. Bennett*).

Paratypes the following. TRINIDAD: I.C.T.A., 14 ♀, 1952-53, ex *Ferrisia virgata* (Ckll.) on cacao, 1 ♀, v. 1953 on guava, 4 ♀, v. 1953, ex *Ferrisia* on guava, 2 ♀, vi-ix. 1953, ex *Ferrisia* on *Gliricidia* (*F. D. Bennett*). SALVADOR: Rosario, Cuscattan, 1 ♀, 1955 (*P. A. Berry*).

Holotype and paratypes in British Museum (Natural History), paratypes in U.S. National Museum, in Citrus Experiment Station, Riverside, California, and in Imperial College of Tropical Agriculture.

Aenasius punctatus Compere

(Text-fig. 74)

1937 *Aenasius punctatus* Compere, *Proc. Hawaii. ent. Soc.* 9 (3) : 388-9, 391, 394-5.

Head, pro- and mesothorax, and to a lesser extent metathorax, propodeum and sides of gaster with reticulate microsculpture very strong and regular : this gives the species a velvety appearance which is in striking contrast with that of its shining congeners.

Head from above relatively long, median length about half breadth; frontovertex to total breadth = 1 : 3.7; with ocelli in a decidedly to moderately acute triangle; in facial view with cheeks strongly curved, narrowed to mouth at more than half a right angle; in side view rather long and strongly curved : facial impression about two-fifths height of head, not bordered by a distinct keel above or at sides. Frontovertex with orbital piliferous punctures small, but very distinct and regular, and at narrowest with four rows of large punctures, which are relatively clear-cut and deep, between these.

Mandibles slender, bidentate.

Antenna with scape (Text-fig. 74) twice as long (dorsally) as its greatest breadth, the lamina bulging very slightly outward at apex; with pedicellus about as long as broad; with first five funicle segments saucer-shaped, the sixth a little longer, and club about 1.3 times length of combined funicle segments. Greatest width of scape 0.9 times narrowest width of frontovertex.

Pronotum, mesoscutum, axillae and scutellum beset with rather strong piliferous punctures that mostly are separated by much less than their own diameters. Propodeum with spiracles large and sub-circular.

Fore wings relatively narrow, with outer margin strongly curved and anal angle strongly rounded: marginal vein relatively very short, the postmarginal extending about to tip of uncus or beyond it, the radial stout, a little curved: hyaline streak from tip of uncus absent: speculum not free of small hairs: prebasal area regularly beset with hairs which are not so very much larger than those on postbasal area and do not tend so much to be in distinct rows as in other species, the costal cell rather similar.

Head a medium green, with brassy and bronzy reflections, and with some red-violet coloration especially beside the facial impression and on genae. Pronotum, mesoscutum, axillae and scutellum a medium green, usually with bronzy to red-violet reflections: mesopleura and sides of propodeum usually much like mesoscutum but sometimes paler: tegulae usually paler, often in part quite a pale brown. Gaster beneath and on sides much like mesopleura, though sometimes paler; on its smooth upper surface blackish to brownish, with bronzy to purplish reflections. Antennae brownish black to blackish brown, with metallic reflections, the lamina of scape strongly shining, the remainder of antenna much less so: scape and pedicellus above sometimes a dull green. Legs with coxae coloured about like mesopleura: fore and hind femora and tibiae in part similar, but paler: legs otherwise brownish, the mid and hind tarsi whitish, dark at apex.

Redescribed from the following material. BRAZIL: São Paulo, Orchidarum, *ex Phenacoccus* sp. on *Tabouchina granulosa*, 1 ♀ (paratype), 5.xi.1934 (*H. Compere*); Limeira, 1 ♀, 3.vii.1958 (*S. Flanders*). URUGUAY: Montevideo, Carrasco, 1 ♀, *ex Pseudococcus* sp., 1943, 2 ♀, ex leaf galls on *Baccharis*, 21.v.1943 (*H. L. Parker*); S. Amer. Parasite Lab., 1 ♀, 24.v.1946 (*P. A. Berry*). Material in U.S. National Museum, Citrus Experiment Station, Riverside, and British Museum (Natural History).

Aenasius vexans sp. n.

(Text-fig. 63)

Head from above moderately broad, median length about half breadth; frontovertex about a quarter total breadth; in side view rather long and strongly curved (Text-fig. 63); in facial view with cheeks narrowed to mouth at more than half a right angle; facial impression over two-fifths height of head, bordered by a distinct keel above but not at sides. Frontovertex sculpture as described for *hyettus* Walker.

Mandibles slender, bidentate, the upper tooth a little the longer.

Antenna with scape one-half longer (dorsally) than its greatest breadth, the lamina bulging very slightly outward at apex; with pedicellus a little longer than broad; with first four funicle segments saucer-shaped, the fifth and sixth longer, and club one-fifth longer than the combined funicle segments. Greatest width of scape 1.1 times narrowest width of frontovertex.

Pronotum, mesoscutum, axillae and scutellum finely reticulate, beset with shallow piliferous punctures that mostly are separated by rather more than their own diameters on mesoscutum, and are rather sparser on scutellum.

Fore wings relatively narrow, with outer margin strongly curved and with anal angle very well rounded: postmarginal extending beyond tip of uncus, the radial hardly curved: hyaline streak absent: costal cell narrow, bearing two rows of strong hairs.

Head blue-green with much red-violet coloration. Pronotum, mesoscutum in greater part, axillae and scutellum blue-green with bright reflections and sometimes with red-violet coloration: tegulae and sides of mesoscutum pale brown, with weak metallic reflections. Pleura, propodeum and gaster pale brown, darkened in part, with weak metallic reflections. Antennae brownish black to blackish brown, with bright metallic reflections, the scape distinctly pale at apex above. Legs usually paler than in most species, from blackish brown on coxae, merging to pale testaceous: mid and hind tarsi usually whitish, dark towards apex.

Holotype ♀. BRAZIL, São Paulo, xii.1935, ex *Phenacoccus* sp. (E. Hambleton).

Paratypes the following. BRAZIL, São Paulo, 1 ♀, 28.xii.1934, ex *Phenacoccus* sp. on *Bougainvillea*, 1 ♀, xii.1935, ex *Phenacoccus* sp. (E. Hambleton). MEXICO, Magdalena Is., Tres Marias, ♀, 26.v.1925 (H. H. Kieffer).

Holotype ♀ in U.S. National Museum, paratypes in collection of Citrus Experiment Station, Riverside, and in British Museum (Natural History).

Aenasius phenacocci Bennett

(Text-fig. 75)

1957 *Aenasius phenacocci* Bennett, *Can. Ent.* **89** (12): 569-70.

Head from above rather long, median length to breadth = 1:1.7 to 2.0; frontovertex about a quarter total breadth; in side view rather strongly and evenly curved, though more strongly just above side of facial impression: face rather long, with cheeks narrowed to mouth at about half a right angle: facial impression about two-fifths height of head, not bordered by a distinct keel above or at sides. Frontovertex with microsculpture extremely fine: head sculpture otherwise as described for *hyettus* Walker.

Mandibles bidentate, the upper tooth the longer and broader.

Antenna with scape (Text-fig. 75) one-half longer (dorsally) than its greatest breadth, the lamina curving inward from apex; with pedicellus one-half longer than broad; with funicle segments short and broad, the club about one-half longer than the combined funicle segments. Greatest width of scape 1.1 times narrowest width of frontovertex.

Pronotum, mesoscutum, axillae and scutellum very finely reticulate, somewhat shining, beset with shallow piliferous punctures that are separated by about their own diameters on mesoscutum but are sparser on scutellum, especially near apex. Propodeum with spiracles broad-oval to sub-circular and very large.

Fore wings with outer margin distinctly curved and with anal angle well rounded: post-marginal clearly not extending to level of tip of uncus, the radial slightly curved: hyaline streak absent: costal cell bearing three rows of rather strong hairs.

Head blue-green, in part brassy green, with some red-violet coloration near facial impression, sometimes much more widespread: mouth region more bronzy. Pronotum, mesoscutum, tegulae, axillae and scutellum blue-green, with reflections weak but bright. Pleura, propodeum and gaster brownish black, with moderate metallic reflections. Antennae blackish brown, overspread with bright, pale bronzy reflection, the scape and pedicellus very distinctly pale brown, sometimes almost whitish, at apex. Leg colour much as described for *hyettus* Walker, but the whitish parts infused with pale brown.

Redescribed from the following. ST. VINCENT, 1 ♀ (H. H. Smith), (mixed with *hyettus* Walk. in Brit. Mus. coll.). TRINIDAD, I.C.T.A., 2 ♀, v.1955, ex *Phenacoccus gossypii* Towns. & Ckll. on *Acalypha*; 11 ♀, v.1953, ex *P. gossypii* on *Hibiscus*; St. Augustine, 3 ♀, iii.1961, "ex mealybugs" (F. D. Bennett). BRITISH GUIANA, Georgetown, 3 ♀, 15.x.1961, "on ornamentals" (F. D. Bennett). Material in

Imperial College of Tropical Agriculture, Trinidad, in Citrus Experiment Station, Riverside, in U.S. National Museum and in British Museum (Natural History).

This and the two following species are very closely related.

Aenasius masii Domenichini

(Text-fig. 58)

1951 *Aenasius masii* Domenichini, *Boll. Zool. agr. Bachic.* **17** (3) : 168-71.

Head from above (Text-fig. 58) decidedly broad, median length to breadth = 1 : 2.1 to 2.3 ; frontovertex to total breadth = 1 : 4.6 to 4.9, with ocelli in an acute triangle ; in side view more strongly curved above than in middle : face rather long, with cheeks narrowed to mouth at about or less than half a right angle : facial impression about half height of head, not bordered by a distinct keel above or at sides. Frontovertex with microsculpture of moderate strength ; with orbital piliferous punctures small, and at narrowest with three or four rows of coarse punctures between these, the coarse punctation irregular and relatively deep.

Mandibles bidentate, the upper tooth the longer and broader.

Antenna with scape one-half longer (dorsally) than its greatest breadth, the lamina curving well inward from apex ; with pedicellus about one-half longer than broad ; with first five funicle segments saucer-shaped, the sixth longer, and club about one-half longer than the combined funicle segments. Greatest width of scape 1.5 times narrowest width of frontovertex.

Pronotum, mesoscutum, axillae and scutellum with reticulate microsculpture regular and rather strong, beset with piliferous punctures that mostly are separated by about or rather less than their own diameters on mesoscutum but are rather sparser on scutellum.

Shape of fore wings as described for *phenacocci* Bennett : postmarginal reaching nearly as far as tip of uncus, the radius moderately curved : hyaline streak absent (or only indicated) : costal cell bearing three rows of rather strong hairs.

Head for the most part red-violet with some bronzy reflections, and with patches of green and blue in region of ocelli and lower part of inter-scorbal prominence, or more widespread. Pronotum, mesoscutum, tegulae, axillae and scutellum a dull, steely to olive-green, with bronzy to red-violet reflections. Pleura, propodeum and gaster blackish or paler, with metallic reflections. Antennae blackish brown with weak, mostly pale bronzy, reflections, the scape sometimes paler at extreme apex. Legs darker coloured than in most known members of the *hyettus* group, mostly deep brownish black with metallic reflections, including even the mid tibiae : mid femora sometimes mostly pale brown : mid and hind tarsi whitish with infusion of pale brown, dark at apex.

Redescribed from the following. PERU, Valle Carabayllo, 1 ♀ (paratype) " parasita di *Pseudococcus citri* e *P. maritimus* " (J. Lamas) ; Canete, 1 ♀, 10.v.1941 (P. A. Berry). Material in collection of G. Domenichini and in U.S. National Museum.

Aenasius flandersi sp. n.

Head from above decidedly broad, median length to breadth = 1 : 2.0 to 2.4 ; frontovertex a quarter the total breadth ; in side view much as in *masii* Domen. ; in facial view with cheeks narrowed to mouth at more than half a right angle : facial impression about one-third height of head, not bordered by a distinct keel above or at sides. Frontovertex with microsculpture of moderate strength ; with orbital piliferous punctures small, and at narrowest with about four rows of relatively shallow, coarse punctures between them, not so irregular as in *masii* Domen.

Mandibles slender, bidentate, the upper tooth broader and much the longer.

Antenna with scape one-half longer (dorsally) than its greatest breadth, the lamina curving well inward from apex ; with pedicellus moderately longer than broad ; with first four funicle segments saucer-shaped, the fifth and sixth longer, and club slightly longer than the combined funicle segments. Greatest width of scape equal to that of frontovertex.

Pronotum, mesoscutum, axillae and scutellum with reticulate microsculpture regular and of moderate strength, beset with piliferous punctures that are separated by about their own diameters on mesoscutum but are much sparser on scutellum.

Fore wings with outer margin more curved and anal angle more rounded than in *phenacocci* Bennett; postmarginal not reaching level of tip of uncus, the radial moderately curved: hyaline streak absent: costal cell bearing four rows of rather strong hairs.

Head blue-green, with reflections brassy to bronzy, and with some red-violet coloration on genae. Pronotum, mesoscutum, tegulae, axillae and scutellum dull blue-green to steely green, with indefinite metallic reflections. Pleura, propodeum and gaster blackish, with bright reflections. Antennae brownish black, with bright metallic reflection, the scape very distinctly pale at apex. Leg colour much as described for *masii* Domen., or rather paler.

Holotype ♀. U.S.A.: California, San Diego, Balboa Park, 15.viii.1958 on *Pittosporum* (*S. Flanders*).

Paratypes. PERU: unlocalized, 3 ♀, 10.vi.1958, ex mealybug on cotton (*S. Flanders*); Canete, 9 ♀, v-vi.1941, ex caged cotton buds (*P. A. Berry*), 2 ♀, (no further data) (*E. J. Hambleton*); Piura, 1 ♀ (*P. A. Berry*). URUGUAY, Montevideo, 1 ♀, 24.viii.1942 (*P. A. Berry*).

Holotype in U.S. National Museum, paratypes in U.S. National Museum, in Citrus Experiment Station, Riverside, and in British Museum (Natural History).

Aenasius connectens sp. n.

(Text-figs. 64, 76, 83)

Head, seen from above, moderately long, median length to breadth = 1:1.9; frontovertex over a quarter total breadth; in side view (Text-fig. 64) more strongly curved below than above middle, and bent round rather sharply from sides of facial impression to mouth region: facial impression about two-fifths height of head, decidedly broad (Text-fig. 83), bordered by a distinct keel above but not at sides. Frontovertex dull, with microsculpture fine to moderate, with orbital piliferous punctures small and rather indistinct, and at narrowest with four rows of coarse punctures, which are not very shallow, between these: one to two rows of large punctures descend between eye and facial impression, and do not nearly reach the malar line (Text-fig. 83).

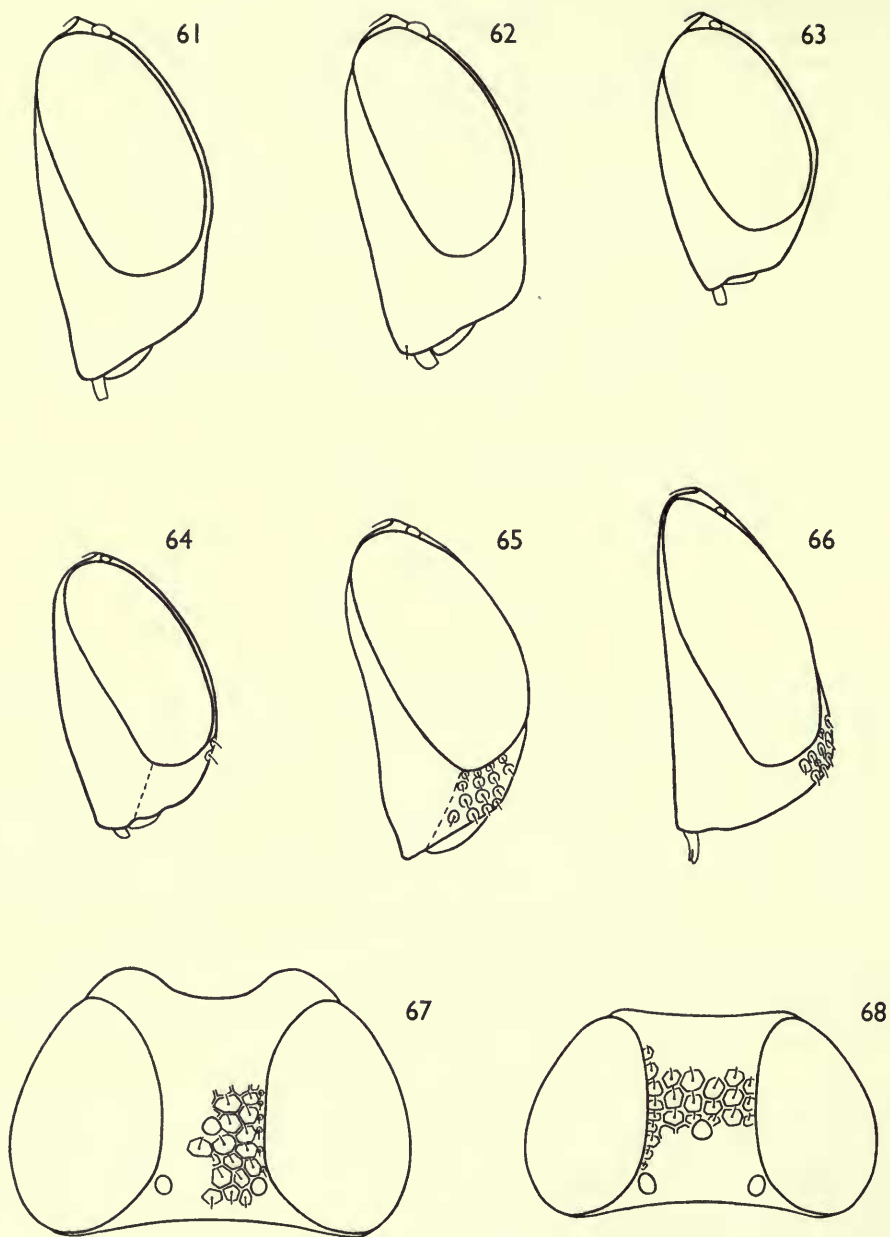
Antenna with scape (Text-fig. 76) about three-fifths longer than its greatest breadth, the lamina falling almost vertically at apex; with pedicellus one-half longer than apically broad; with first three funicle segments saucer-shaped, the remainder short-cylindrical, the sixth three times as broad (apically) as long, the club about one-fifth longer than combined funicle segments.

Mandibles bidentate, the upper tooth slightly the longer and larger.

Pronotum, mesoscutum, tegulae, axillae and scutellum with reticulate microsculpture regular and strong, beset with weak piliferous punctures that mostly are separated by more than their own diameters.

Fore wings with outer margin strongly curved and anal angle strongly rounded; costal cell sub-parallel almost to apex, where the wing margin is sharply incised: marginal vein relatively short, the postmarginal extending well beyond tip of uncus, the radial emitted at a very acute angle, slightly curved: hyaline streak absent: costal cell bearing two rows of strong hairs on upper surface, the remaining hairs much smaller.

Head blue-green, with brassy to coppery reflections strongest above, and with red-violet strongest above the facial impression. Pronotum blue-green, mesoscutum duller, and axillae and scutellum still duller, with bright reflections which are more definitely bronzy to red-violet on scutellum. Postspiracular sclerite pale testaceous-brown; mesopleura and sides of propodeum duller, and having dark patches bearing weak metallic green reflection: propodeum above and gaster dark brown, largely overspread with dull blue-green. Antennae blackish brown,



FIGS. 61-68. *Aenasius* species, females. 61-66. Head, in dextro-lateral view of 61, *Aen. similis* sp. n. ; 62, *Aen. maplei* Comp. ; 63, *Aen. vexans* sp. n. ; 64, *Aen. connectens* sp. n. ; 65, *Aen. advena* Comp. and 66, *Aen. frontalis* Comp. 67-68. Head, seen from above, of 67, *Aen. frontalis* Comp. and 68, *Aen. cariocus* Comp. f. *theobromae* Kerrich (drawn from holotype of *theobromae*).

with metallic reflections, the scape on outer side and pedicellus above distinctly green : scape and pedicellus narrowly at apex, and funicle segments 4 and 5 pale yellow-testaceous, the first three and sixth funicle more or less dusky. Legs having coxae and trochanters dull brown with green metallic reflections, merging to pale testaceous-brown : mid tibiae dark at apex and mid tarsi largely whitish.

Holotype ♀. URUGUAY: near Montevideo, S. American Parasite Lab., reared 24.v.1946 (*P. A. Berry*).

Paratype. URUGUAY: 1 ♀ (same data as holotype).

Holotype in U.S. National Museum: paratype in British Museum (Natural History).

This species forms a clear connecting link between *advena* Comp. and the group composed of *paulistus* Comp. and *insularis* Comp. It shares with *paulistus* and *insularis* the incision of the fore margin of the wing at the apex of the costal cell, the broad facial impression, and the feature of the large punctures not descending to near the malar line, though they do descend further than in those species. It differs from them most notably in having the frontovertex relatively narrow, with the ocelli in an obviously acute triangle, the facial impression sharply bordered above, and the mandibles not tridentate. The broadly laminate antennal scape places it near *advena* Comp., whereas *paulistus* and *insularis* have the scape of a form not found in any other known species (cf. Text-fig. 79).

Aenasius advena Compere

(Text-figs. 65, 77, 84)

1937 *Aenasius advena* Compere, *Proc. Hawaii. ent. Soc.* 9 (3) : 384, 388-9, 393.

1937 *Aenasius ianthinus* Compere, *Ibidem* : 388, 391, 393-4, here considered as variety of the above, **stat. n.**

Head, seen from above, more or less broad, breadth at least about twice median length, about 2.3 times in best developed specimens ; frontovertex about one-fifth total breadth ; in side view (Text-fig. 65) rather evenly curved to mouth ; facial impression about one-third height of head, narrow, especially narrowed above, not bordered by a distinct keel above or at sides (Text-fig. 84). Frontovertex with microsculpture very fine, with orbital piliferous punctures small but regular, and at narrowest with four rows of large punctures, which are relatively shallow, between these : two to three rows of large punctures descend between eye and facial impression, and nearly reach the malar line.

Antenna with scape (Text-fig. 77) 1.5 times to nearly twice as long as its greatest breadth, the lamina curving strongly inward from apex ; with pedicellus about twice as long as apically broad ; with funicle segments more short-cylindrical than saucer-shaped, the sixth three times as broad (apically) as long, the club one-half longer than the combined funicle segments. Greatest width of scape 0.9 times narrowest width of frontovertex.

Mandibles bidentate, the upper tooth the longer and broader.

Pronotum, mesoscutum, axillae and scutellum with reticulate microsculpture regular and rather strong, beset with piliferous punctures that mostly are separated by about their own diameters on mesoscutum but are sparser on scutellum.

Fore wings with lower part of outer margin moderately curved, with anal angle rather sharp : postmarginal clearly not extending to level of tip of uncus, the radial emitted at a relatively acute angle, slightly curved : hyaline streak absent : costal cell bearing usually four rows of rather strong hairs.

Coloration of the type series and of similar specimens is as follows: head blue-green, in large part with brassy reflections, around median ocellus more coppery and golden; with a little red-violet before occipital margin and on hinder genae. Pronotum blue-green, with red-violet especially on shoulders: mesoscutum, tegulae, axillae and scutellum more a steely green, with indefinite bright reflections. Pleura, propodeum and gaster blackish or paler, with bright reflections. Antennae blackish brown, with metallic reflections: scape and pedicellus at apex, and first four, or sometimes only three, segments pale yellow-testaceous: pedicellus often distinctly green above. Legs brownish black, the mid legs rather paler: tarsi testaceous to whitish, dark at apex.

Specimens attributed to var. *ianthinus* Compere are coloured as follows: head a much deeper blue-green, with a triangular red-violet mark extending forward from occiput between ocelli, and with red-violet strong above, beside and to some extent across the facial impression, and on genae: brassy reflections on frontovertex absent, or weak and indeterminate. Red-violet coloration strong on scutellum and strong to very strong on scutum.

Compere (1937) described this form as a species, though he wrote that it was structurally much like *advena* Compere and might be a variant of it. I now know numerous intermediate colour gradations and find, moreover, that the colour is not always approximately constant in all specimens of a reared series. In consequence, the form is here reduced to varietal status. Dr. B. D. Burks has compared the type with several colour forms and with reference to my manuscript description, and he concurs.

Redescribed from the following material. BRAZIL: Bahia, São Salvador, 1 ♀, 4.x.1934, ex *Pseudococcus* on *Macquilla tomentosa* (H. Compere); unlocalized, 1 ♀, 1953, "ex B526" (D. C. Lloyd) (propagated at Riverside by S. Flanders); Rio de Janeiro, 2 ♀, 27.x.1962, 1 ♀, iii.1963, on citrus (*A. Perachi* & F. D. Bennett). TRINIDAD: I.C.T.A., 3 ♀, 1952-53, ex *Ferrisia virgata* (Ckll.) on cacao, 7 ♀, viii.1953, ex *Ferrisia* on *Gliricidia*, Toco, 1 ♀, v.1953, Manzanilla, 8 ♀, v-vi.1952-53, ex *Ferrisia virgata* on cocoanut (F. D. Bennett). PANAMA: 7 ♀, 23.iv.1911 (E. A. Schwarz). ST. THOMAS: Charlotte Amalie, 1 ♀, 31.v.1917, "parasite of *Pseudococcus virgatus*" (H. Morrison). PORTO RICO: Isabela, 1 ♀, 27.ix.1935, on mealybug (*L. C. Fife*). MEXICO: "Laredo POE", 1 ♀, 17.iv.1953 (Baker). HAWAII: Oahu, Koko Head, 1 ♀, 13.ii, 1 ♀, 27.ii., 1 ♀, 15.iii.1934 (O. H. Swezey) (paratypes); Honolulu, 1 ♀, 27.xii.1943 (N. L. H. Krauss); Johnston Is., 1 ♀, 1.vi.1952 (K. L. Maehler), 2 ♀, 8.vii.1948, on *Vitex trifolia* L. (L. B. Laring). FIJI: Naduruloulou, 4 ♀, ii.1949, ex mealybug on *Albizzia lebbek* (B. A. O'Connor). PHILIPPINES: Manila, 3 ♀, xii.1958, on guava (Krauss). MALAYA, Selangor, Rubber Research Institute, 2 ♀, ii.1958, Bukit Rotan, 2 ♀, 16.vii.1961, ex *Ferrisia virgata* (Ckll.) per (A. Newsam). E. PAKISTAN: Dacca, 2 ♀, 1963, ex *Ferrisia virgata* (Ckll.), per (Government Entomologist). INDIA: Madhya Pradesh, Jabalpur, 2 ♀, 25.xi.1966, ex *Ferrisia virgata* (Ckll.) (B. N. Modi). Material in U.S. National Museum, Citrus Experiment Station, Riverside, Imperial College of Tropical Agriculture and British Museum (Natural History).

This is the only species of the genus known to have a distribution extending outside the neotropical region and southern U.S.A. Specimens of quite typical coloration have been examined from Mexico, Hawaiian Islands and Philippines, specimens attributed to var. *ianthinus* from Brazil, West Indies and Hawaiian Islands.

Aenasius advena Compere var.

Small specimens : large punctures on frontovertex and punctures on mesoscutum abnormally shallow : antennal scape twice or just over twice as long as its greatest breadth : antennae with whole funicle a rich yellow-testaceous, with scape at least broadly at apex, and in one specimen also with club similarly coloured, having only weak infuscation.

Described from the following. U.S.A.: Florida, Key Largo, 2 ♀, 26.xii.1954 (H. V. Weems Jr.).

Aenasius frontalis Compere

(Text-figs. 66-67, 78)

1937 *Aenasius frontalis* Compere, *Proc. Hawaii. ent. Soc.* 9 (3) : 388-9, 391-2.

Head, seen from above (Text-fig. 67), elongate, median length to breadth = 1 : 1.8, with frontal emargination deep ; frontovertex between a fifth and a quarter the total head breadth, with ocelli in a moderately acute triangle (80°) ; in side view (Text-fig. 66) seen to be falling forward and then bent round at almost a right angle to mouth region : facial impression about one-third height of head, bordered by a sharp keel above and at sides. Frontovertex strongly shining, with microsculpture very fine to rather fine, with orbital piliferous punctures quite small but regular, and at narrowest with four rows of large punctures, which are coarse but usually rather shallow between these : two rows of large punctures descend between eye and facial impression, and rather nearly reach the malar line.

Mandibles bidentate, the upper tooth much the longer.

Antenna with scape (Text-fig. 78) 1.5 to 1.8 times length of its greatest breadth, the upper margin rising relatively steeply from base, the lamina curving well inward from apex ; with pedicellus twice as long as its apical breadth ; with funicle segments cup-shaped to short-cylindrical, the sixth about $2\frac{1}{2}$ times as broad as long ; with club about $1\frac{1}{2}$ times length of combined funicle segments.

Reticulate microsculpture fine on pronotum, sides of mesoscutum, tegulae and axillae, of moderate strength on scutellum, sharp and strikingly transverse on most of mesoscutum : mesoscutum and scutellum sharply beset with piliferous punctures that, except sometimes at sides, are separated by more, usually much more, than their own diameters.

Fore wings relatively rather narrow, with lower part of outer margin slightly emarginate and with anal angle relatively sharp : radial strongly curved, without a defined uncus, the post-marginal clearly not reaching level of its tip : hyaline streak present : costal cell bearing two rows of strong hairs, the remaining hairs much smaller.

Head bright blue-green to peacock-blue, with red-violet reflection, which is strongest beside the facial impression ; brassy-green before occipital margin, narrowly along orbits, and in region of mouth and toruli. Pronotum, mesoscutum, tegulae, axillae and scutellum a much duller blue-green than the head, sometimes almost a steely green, with red-violet and bronzy reflections especially at sides. Pleura, propodeum and gaster pale brown to brownish black, with reflections which on gaster in part and sides of propodeum are green. Antennae with scape in greater part, pedicellus and club brownish black, with bright metallic reflection : scape quite broadly at apex above, pedicellus at extreme apex, and funicle segments yellow-testaceous, the sixth funicle segment slightly darkened, or quite dark like the club. Legs with coxae and trochanters mostly blackish brown, with femora, tibiae and fore tarsi testaceous, often rather pale : mid and hind tarsi more whitened, dark toward apex.

Redescribed from the following material. PANAMA: Montelirio, 1 ♀, Taboga, 1 ♀, iii.1924 (D. T. Fullaway) (paratypes) ; Canal Zone, Paraiso, 1 ♀, iii.1911 (E. A. Schwarz). TRINIDAD: I.C.T.A., 1 ♀, v.1952, 2 ♀, 1952-53, ex *Ferrisia virgata* (Ckll.) on cacao (F. D. Bennett). Material in U.S. National Museum, Citrus Experiment Station, Riverside, and British Museum (Natural History).

Aenasius chapadae Ashmead

1900 *Aenasius chapadae* Ashmead, *Proc. U.S. natn. Mus.* **22** : 371.

1904 *Aenasius chapadae* Ashmead; Ashmead, *Mem. Carneg. Mus.* **1** (4) : 496, Pl. XXXVIII, fig. 1.

1937 *Aenasius chapadae* Ashmead; Compere, *Proc. Hawaii. ent. Soc.* **9** (3) : 388, 394.

Thinking that the more bluish form of *frontalis* Comp. might be *chapadae*, I sent one such specimen in 1962 to Dr. B. D. Burks. He kindly compared it with the type, referring to my manuscripts, and replied that *chapadae* ran down in my key with *frontalis* but was not the same as the species sent. He kindly supplied the differentiating characters now incorporated in the key, adding that Ashmead's figure represented accurately the relative breadth of the frontovertex in *chapadae*.

Aenasius paulistus Compere

(Text-figs. 79, 85)

1937 *Aenasius paulistus* Compere, *Proc. Hawaii. ent. Soc.* **9** (3) : 385, 388-92, 401-3.

Head from above with median length to breadth = 1 : 2.0 to 2.2; frontovertex to total breadth = 1 : 3.3 to 3.6, with ocelli in about a right-angled triangle; in side view rather long and almost evenly curved, almost as in *advena* Comp. (Text-fig. 65): cheeks rather short and sharply narrowed: facial impression broad, about two-fifths height of head, not sharply bordered except beside lower half of toruli. Frontovertex with reticulate microsculpture fine, with orbital piliferous punctures rather strong, and at narrowest with five rows of large punctures, which are of fully normal depth, between them: large punctures descending not far below upper margin of facial impression (Text-fig. 85).

Mandibles obscurely tridentate, with an uppermost tooth much the smallest and well set back.

Antenna with scape (Text-fig. 79) two and a half times length of its greatest breadth; with pedicellus nearly twice as long as broad; with funicle segments short-cylindrical to broad saucer-shaped, the club 1.7 times length of the combined funicle segments.

Pronotum, mesoscutum, tegulae, axillae and scutellum with microsculpture rather fine, beset with piliferous punctures that on mesoscutum are regular, relatively deep, and mostly separated by about or rather less than their own diameters, but are shallower and sparser on axillae and scutellum. Propodeum with spiracles large, very broad-oval.

Fore wings with lower part of outer margin rather strongly curved, and anal angle well rounded: fore margin moderately incised at apex of costal cell (Compere, 1937, fig. 4): marginal vein rather long, the postmarginal extending just beyond tip of uncus, the radial moderately curved: hyaline streak not fully developed (though it may be indicated): costal cell bearing three rows of strong hairs on upper surface, the lower two merging in about distal half: wing infuscation fading out towards outer margin.

Head blue-green, with light brassy reflections; sometimes bronzy around ocelli, in mouth region and on hinder genae. Pronotum, mesoscutum, tegulae, axillae and scutellum a duller blue-green, with considerable bronzy reflection. Sometimes there is much violet on the frontovertex, especially on the ridges of the reticulations, and much red-violet on pronotum and mesoscutum. Pleura, propodeum and gaster dull brown to brownish black, with moderate metallic reflections which in parts are blue-green. Antennae with scape largely, pedicellus at apex, and funicle segments yellow-testaceous; with scape at base and along much of lower margin and part of upper margin, pedicellus mainly, and club blackish brown with green metallic reflections. Legs with coxae, trochanters, and femora in part brownish black, with metallic reflections, merging to dull testaceous on femora and tibiae: tarsi pale testaceous, darkened at apex.

Redescribed from the following. BRAZIL: São Paulo, 3 ♀, 4.xi.1934, with *Pseudococcus fragilis* Brain and *P. longispinus* Targ. (= *aonidium* auctt.) on *Hedera helix*, 1 ♀, 4.xii.1934 (*H. Compere*); São Paulo, 1 ♀, 28.xii.1934, ex *Phenacoccus* sp. on *Bougainvillea* (*E. Hambleton*). Material in collection of Citrus Experiment Station, Riverside and in British Museum (Natural History).

Aenasius insularis Compere

1937 *Aenasius insularis* Compere, *Proc. Hawaii. ent. Soc.* 9 (3) : 388-92, 400-1.

Head shape much as in *paulistus* Comp., but the cheeks more rounded : large punctures descending even less far below upper margin of facial impression (cf. Text-fig. 85), the impression similar in shape but very ill-defined at sides. Head median length about half breadth ; frontovertex to total breadth = about 1 : 3.6, with ocelli in about a right-angled triangle. Frontovertex with reticulate microsculpture fine, with orbital piliferous punctures small above, moderate below, and at narrowest with four to five rows of large punctures, which are relatively shallow, between them.

Mandibles as in *paulistus* Compere, obscurely tridentate.

Antenna with scape of the same general shape as in *paulistus* Compere but rather longer, over two and a half but well under three times length of its greatest breadth ; with pedicellus one and a half times to nearly twice as long as broad ; with funicle segments short cup-shaped to saucer-shaped, the club one and two-thirds times length of the combined funicle segments.

Pronotum, mesoscutum, tegulae, axillae and scutellum with microsculpture finer than in *paulistus* Comp., the piliferous punctures on mesoscutum rather shallower and mostly separated by more than their own diameters, and on axillae and scutellum quite shallow and sparse. Propodeum with spiracles transverse-oval, not abnormally large.

Fore wings much as described for *paulistus* Comp., but the costal cell sometimes bearing only two rows of strong hairs on upper surface : wing infuscation curving outward from apex of radial, leaving the wing very broadly hyaline by outer margin.

Head blue-green, with light brassy reflections, bronzy in part on frontovertex, mouth region and on hinder genae. Pronotum, mesoscutum, tegulae, axillae and scutellum with some blue-green, but scarcely discernible beneath the overspread of red-violet to bronzy. Coloration of pleura, propodeum and gaster as described for *paulistus* Comp., but the brown much paler in one small specimen. Antennal colour much as in *paulistus* Comp., but the club largely dull yellow-testaceous, pale blackish brown near base. Leg colour much as described for *paulistus* Comp.

MEXICO. Redescribed from two paratypes and one specimen with similar data.

Aenasius nitens sp. n.

Head, seen from above, elongate, median length (measured from above scrobal impression) to breadth = 1 : 1.9 ; frontovertex relatively broad, to total breadth = 1 : 2.6, with ocelli in a decidedly obtuse triangle ; in side view very gently curved both above and below middle, where it is almost angled, then at level of toruli more sharply bent round to mouth region ; in frontal view with cheeks long and well rounded, with facial impression small, about a quarter the height of head, sharply margined at sides, and with inter-scrobal prominence broad, and so convex that it is visible when the head is viewed from above. Frontovertex strongly shining, with microsculpture so extremely fine as to be almost imperceptible $\times 65$, with orbital piliferous punctures strong, and with larger punctures in a loose reticulation, four of them in transverse line with the median ocellus but a transverse row of six immediately in front of these : three rows of large punctures, merging to two, and the orbitals, descend between eye and facial impression and almost reach the malar line.

Mandibles bidentate, the upper tooth slightly the longer.

Antenna with scape 3.4 times length of its greatest breadth, broadest in basal third; with pedicellus twice length of its greatest breadth; with funicle segments cup-shaped to cylindrical, the sixth not twice as broad as long; club only moderately expanded from funicle, relatively elongate, $2\frac{1}{2}$ times length of its greatest breadth and equal in length to funicle and pedicellus together.

Pro- and mesonota decidedly shining, though less strongly than the frontovertex: reticulate microsculpture on mesoscutum and axillae fine but very distinct, and on scutellum appreciably a little stronger: these sclerites sharply piliferous-punctate, the punctures separated by, on average, about their own diameters.

Fore wing narrow, with lower part of outer margin moderately emarginate and with anal angle somewhat sharp: radial strongly curved, without a defined uncus, the postmarginal not quite reaching level of its tip: hyaline streak present: costal cell bearing two rows of strong hairs, which merge to one row in apical fifth.

Head bright green, with brassy reflections on the ridges, merging to coppery from before the median ocellus down to the malar line. Pro- and mesonota bright green, overspread with brassy and, in small patches, bronzy reflection. Pleura and propodeum above blackish brown with weak reflection: propodeum at sides and gaster the same, but with reflections brighter and in part green. Antennae with scape a rich orange-testaceous, slightly darkened along upper and lower margins; having pedicellus except at apex black, with bright reflection; having pedicellus at apex and first five funicle segments dull brown, somewhat infusate above, and sixth funicle segment and club blackish brown with weak reflection. Legs blackish with bright reflections, the femora at apex and tibiae in greater part brown: tarsi testaceous, the mid metatarsi whitish except at apex.

Holotype ♀. U.S.A.: Nebraska, Halsey, 15.vii.1957 (*R. Henzlik*). Holotype in U.S. National Museum.

This is the species most resembling a *Chalcaspis*, on account of the strongly shining, relatively broad frontovertex.

Aenasius pacificus Compere

(Text-figs. 80, 86)

1937 *Aenasius pacificus* Compere, *Proc. Hawaii. ent. Soc.* 9 (3): 388-91, 399-400.

Head from above moderately broad, median length to breadth = 1:1.8 to 2.2; frontovertex to total breadth = 1:3.4 to 3.9, with ocelli in about a right-angled triangle; in side view rather short, evenly curved round to mouth: cheeks short, sharply narrowed: facial impression small and shallow, about a third the height of the head, not sharply bordered. Frontovertex with reticulate microsculpture regular and rather fine, with orbital piliferous punctures moderate above, strong below, and at narrowest with four rows of large punctures, which are rather shallow, between them: two rows of large punctures and the orbital punctures descend between eye and facial impression, and reach just below level of bottom of eye (Text-fig. 86).

Mandibles bidentate, the upper tooth longer than the lower.

Antenna with scape (Text-fig. 80) 3 to $3\frac{1}{2}$ times length of its greatest breadth, broadest just before middle; with pedicellus almost twice length of its greatest breadth; with funicle segments broad cup-shaped to short-cylindrical, the sixth $2\frac{1}{2}$ times as broad as long: club (see Compere, 1937) equal in length to pedicellus and funicle together.

Reticulate microsculpture on pronotum, mesoscutum and axillae very fine, on scutellum much stronger and more regular: punctures on mesoscutum coarse though shallow, clearly separated by less than their own diameters; on axillae and scutellum finer and sparser, especially towards apex of scutellum.

Fore wing shape much as in *frontalis* Comp., relatively rather narrow, with lower part of outer margin slightly emarginate and with anal angle somewhat sharp; subcostal vein markedly

expanded before apex, marginal vein relatively short, the postmarginal clearly not reaching tip of uncus, the radial very strongly curved : hyaline streak present : costal cell bearing two rows of strong hairs, the lower fading out in apical quarter.

Head blue-green, with frontovertex largely overspread with purplish bronzy reflections, merging further forward to red-violet on the ridges and more brassy in the punctures and on facial impression : mouth region and sometimes hinder genae rather bronzy. Pronotum, mesoscutum, tegulae, axillae and scutellum with fundamental dull blue-green showing weakly through the bright, rather bronzy, reflection. Pleura, propodeum and gaster brownish black to blackish brown with bright reflections, more strongly blue-green around propodeal spiracles and on parts of gaster. Antennae with pedicellus in upper half and club on outer face blackish brown, with metallic green reflection : scape yellow-testaceous, darkened narrowly at base and half way along upper margin, and more broadly along lower margin to beyond middle : remainder yellow-testaceous, the basal funicle segments sometimes, on outer surface, and the club to some extent, a little darkened. Legs with coxae and trochanters, fore and hind femora in greater and mid femora usually in lesser part, and hind tibiae above, brownish black to blackish brown with weak metallic reflections, otherwise dull testaceous : tarsi dull white, darkened at apex.

Redescribed from two female paratypes. MEXICO.

Aenasius longiscapus Compere

1937 *Aenasius longiscapus* Compere, *Proc. Hawaii. ent. Soc.* 9 (3) : 388-91, 398-9.

Head from above with median length to breadth = 1 : 1.8 ; frontovertex to total breadth = 1 : 3.4 to 3.9, with ocelli in a slightly obtuse triangle ; in side view longer than in *pacificus* Comp., bent round rather sharply from sides of facial impression to mouth region (rather as in *frontalis* Comp., Text-fig. 66, but less strongly) : facial impression rather small, about one-third height of head, strongly narrowed above, bordered by sharp keels at sides up to level of large punctures but not higher. Frontovertex markedly shining, with reticulate microsculpture very fine, with orbital piliferous punctures moderate above, strong below, and at narrowest with four rows of large punctures, which are of normal depth, between them : three rows of large punctures merging to two, and the orbital punctures, descend between eye and facial impression and reach well below bottom of eye.

Mandibles bidentate.

Antenna with scape (see Compere, 1937, p. 389) nearly four times length of its greatest breadth, broadest just beyond basal third ; with pedicellus $1\frac{1}{2}$ times length of its greatest breadth ; with funicle segments cup-shaped to short-cylindrical, the sixth twice as broad as long and as broad as the pedicellus is long : club a little longer than pedicellus and funicle combined.

Microsculpture very fine on pronotum, mesoscutum and axillae, regular and of moderate strength on scutellum (i.e. weaker than in *pacificus* Comp.) : punctures on mesoscutum coarse, separated by less than their own diameters, on scutellum similar, but rather sparser in posterior half.

Fore wings as described for *pacificus* Comp., but the marginal rather longer.

Head blue-green, overspread with pale bronzy in region of ocelli, and red-violet on the ridges further forward : facial impression brassy green, the mouth region more bronzy : genae a duller blue-green, with strong brassy reflection. Pronotum, mesoscutum, tegulae, axillae and scutellum with fundamental blue-green showing weakly through the bright bronzy reflection. Pleura, propodeum and gaster as described for *pacificus* Comp. Antennae with scape for the most part, pedicellus at apex, and funicle yellow-testaceous ; the scape at base and half way along lower margin, pedicellus for the most part, and club blackish brown, with very distinct green reflections. Leg colour of similar pattern to that of *pacificus* Comp. but darker, the brownish black deeper and more shining, and the tarsal colour pale testaceous.

Redescribed from the following. TRINIDAD: Wallerfield, 1 ♀, xi. 1958, on *Piper*; I.C.T.A., 1 ♀, iv. 1954, ex *Ferrisia* sp. on *Gliricidia* (F. D. Bennett).

The unique holotype was deposited in the U.S. National Museum, but a slide mount of the left antenna and pair of wings remained with H. Compere, and this has been available on loan to the present author. In the type, the sixth funicle segment is blackish brown like the club. The slight discrepancy between the proportion of the antennal scape given in the present work and that given by Compere (1937) is due to the angle at which the scape settled in the slide mount. Dr. B. D. Burks kindly compared the specimen taken on *Piper* with the type in Washington, with reference to my manuscripts, and wrote on 26th September, 1962 as follows: "In the type the mesoscutum and mesopleuron are more heavily sculptured than in your specimen, but in the absence of other differences I finally convinced myself that they are the same. Certainly the type runs to *longiscapus* in your key."

This species is very closely related to *pacificus* Comp.

Aenasius vadosus sp. n.

Head from above with median length to breadth = 1 : 2.2 ; frontovertex to total breadth = 1 : 4.8, with ocelli in an acute triangle ; in side view curved more strongly in lower than in upper half, but nowhere sharply bent : cheeks short, sharply narrowed at well over half a right angle, though well rounded : facial impression small, about a third the height of head, bordered by sharp keels at sides up to level of large punctures but not higher. Frontovertex with reticulate microsculpture regular and of moderate strength, with orbital piliferous punctures weak above, moderate below, with large punctures irregular and relatively very shallow and loosely reticulate in region of ocelli : two rows of large punctures and the orbital punctures descend between eye and facial impression, and reach just below bottom of eye.

Mandibles bidentate, the upper tooth slightly the longer.

Antenna with scape just over three times length of its greatest breadth, broadest at basal two-fifths, then almost rectilinearly narrowed ; with pedicellus $1\frac{1}{2}$ times as long as broad ; with funicle segments short, the sixth two and a third times as broad as long : club broad, $1\frac{1}{2}$ times length of combined funicle segments.

Reticulate microsculpture extremely fine on mesoscutum and axillae, very fine on scutellum : punctures very shallow, mostly separated by much more than their own diameters on scutum, still sparser on scutellum.

Fore wings as described for *pacificus* Comp., but quite strongly emarginate above the hyaline streak.

Head with blue-green scarcely discernible beneath the overspread of bright, pale bronzy in region of ocelli, normal bronzy further forward ; brassy green on facial impression and in the punctures above and beside it, the mouth region bronzy : genae blue-green, with brassy to bronzy reflections. Pronotum, mesoscutum, tegulae, axillae and scutellum bright bronzy. Antennae with scape, funicle and club yellow-testaceous, the scape only darkened at extreme base and the club only slightly darkened : pedicellus, except beneath, brownish black with green metallic reflections. Legs with coxae, trochanters, fore femora wholly and hind femora, except at apex, brownish black with metallic reflections : there is similar but paler colour on fore tibiae in about basal two-thirds, on hind tibiae above, and on mid femora and tibiae in about basal three-quarters and at extreme apex, merging to a rich testaceous : mid femora and tibiae before apex and tarsi at base almost whitish, the tarsi otherwise pale testaceous.

Holotype ♀. PORTO RICO, Mayaguez, xi. 1959 on coffee (*F. D. Bennett*). Holotype in British Museum (Natural History).

***Aenasius acuminatus* sp. n.**

(Text-fig. 81)

Head from above with median length half breadth : frontovertex a quarter the total breadth, with ocelli in an acute triangle : in side view weakly curved in upper, more strongly in lower half : cheeks much longer than in *vadosus* sp. n., narrowed at well under half a right angle : facial impression rather small, just over one-third the height of head, bordered by sharp keels up to level of large punctures but not higher. Frontovertex with reticulate microsculpture of moderate strength, with orbital piliferous punctures moderate, and at narrowest with four rows of piliferous punctures, which are of normal depth, between them : three rows of large punctures and the orbital punctures descend between eye and facial impression and reach well below bottom of eye.

Mandibles bidentate, the upper tooth slightly the longer.

Antenna with scape (Text-fig. 81) five times length of its greatest breadth, broadest at basal third, then almost rectilinearly narrowed ; with pedicellus $2\frac{1}{2}$ times length of its greatest breadth ; with funicle segments broad cup-shaped to short-cylindrical : club elongate and having the sutures very oblique, over $2\frac{1}{2}$ times as long as broad and over $1\frac{1}{2}$ times length of combined funicle segments.

Reticulate microsculpture on pronotum, mesoscutum and axillae very fine, less fine and more regular towards apex of scutellum ; punctures rather coarse, not exceptionally shallow ; mostly separated by rather more than their own diameters on mesoscutum, if anything a little denser on scutellum except near its apex.

Fore wings as described for *pacificus* Comp., but the marginal rather longer.

Head blue-green, largely overspread above with bronzy, merging to red-violet on the ridges above and beside the facial impression : mouth region and genae with much brassy to bronzy reflection. Pronotum, mesoscutum, tegulae, axillae and scutellum blue-green, almost wholly overspread with bright bronzy. Antennal colouring as described for *longiscapus* Comp., but the club paler. Legs with the same fundamental colour-pattern as in *vadosus* sp. n., but considerably paler.

Holotype ♀. TRINIDAD: Maracas, v.1953, ex *Dysmicoccus brevipes* (Ckll.) on cacao (*F. D. Bennett*). Holotype in British Museum (Natural History).

***Aenasius brasiliensis* (Mercet)**

1926 *Chalcaspis brasiliensis* Mercet, *Eos* 2 : 46-48.

1937 *Aenasius brasiliensis* (Mercet) Compere, *Proc. Hawaii. ent. Soc.* 9 (3) : 288-90, 398.

Head from above moderately broad, median length to breadth = 1 : 2.1 ; frontovertex to total breadth = 1 : 3.3, with ocelli in a slightly obtuse triangle ; in side view short and almost evenly curved : facial impression shallow and not sharply bordered, nearly half height of head. Frontovertex with reticulate microsculpture regular and strong, with orbital piliferous punctures rather strong, and at narrowest with four to five rows of punctures between these.

[Conformation of mandibles not clearly visible on unique type specimen.]

Antenna with scape weakly laminate, almost four times length of its greatest breadth, broadest a little before the middle ; with pedicellus $1\frac{1}{2}$ times length of its greatest breadth ; with funicle segments short-cylindrical, the sixth not twice as broad as long ; with club about equal in length to combined funicle segments.

Mesoscutum finely transversely striate-reticulate, beset with moderate, rather deep, clear-cut punctures that mostly are separated by rather more than their own diameters : scutellum and axillae with reticulate microsculpture shallow but wide, beset with coarse but rather shallow piliferous punctures that mostly are separated by less than their own diameters but are smaller and sparser at sides and on axillae. Propodeum with spiracles large, broad-oval.

Fore wings with lower part of outer margin distinctly a little curved, and with anal angle well rounded: subcostal vein markedly expanded before apex, postmarginal clearly not extending to level of tip of uncus, the radial narrow, very strongly curved: hyaline streak present, though with a row of hairs in it: costal cell broad, bearing two rows and a half row of rather strong, rather sparse, hairs.

Head blue-green, with bronzy coloration in area of ocelli, merging to red-violet and developed mainly on the ridges of the reticulations forward of this and to sides of facial impression. Mesoscutum, axillae, scutellum and tegulae a fundamental dull blue-green, almost entirely overspread with purplish bronzy reflection. Pleura, propodeum and gaster blackish brown to brownish black, with bright reflections, blue-green around propodeal spiracles and in part on gaster above. Antennal scape at base, above and along lower margin, pedicellus except at extreme apex, and club blackish brown with bright reflections, the scape and pedicellus green above: scape in greater part, pedicellus at extreme apex, and funicle yellow-testaceous, the funicle segments a little darkened above. Legs medium brown, with metallic reflections very weak, merging to pale yellow-brown, the tarsi all pale but with apical segment dark, the mid and hind metatarsi whitish in basal half, the mid tibiae dark at apex.

Redescribed from the unique holotype from Corumba, Matto Grosso, Brazil.

Mercet (1926) described the colour of the tegulae as "azules", and Compere (1937) gave "tegulae blue" as a key character. However the colour may have appeared in the specimen when almost fresh, it does not now appear as more than a dull blue-green. Moreover, Mercet described blue-green coloration as "azul" in other cases.

Aenasius cariocus Compere

(Text-figs. 68, 82)

1921 ? *Blepyrus tachigaliae* Brues, *Zoologica* 3 (9): 229-30. New York.

1937 *Aenasius cariocus* Compere, *Proc. Hawaii. ent. Soc.* 9 (3): 388-91, 399.

1937 *Aenasius colombiensis* Compere, *Ibidem*, 9 (3): 403-4, **syn. n.**

1953 *Aenasius theobromae* Kerrich, *Bull. ent. Res.* 44 (4): 796-7, **syn. n.**

Head from above variable in breadth, median length to breadth = 1:1.7 to 2.3; frontovertex to total breadth = 1:2.8 to 3.9, with ocelli in a slightly obtuse triangle (Text-fig. 68); in side view more strongly curved below than above: facial impression moderately deep, over two-fifths height of head. Frontovertex shining, with reticulate microsculpture very fine to moderate in strength, with orbital piliferous punctures normally moderate, and at narrowest with four, occasionally five, rows of relatively rather shallow punctures between them.

Antenna with scape (Text-fig. 82) moderately laminate, 3 to 3½ times length of its greatest breadth, broadest about in middle; with pedicellus scarcely a quarter longer than apically broad; with funicle segments cup-shaped to short-cylindrical, the sixth not quite twice as broad as long; with club one-fifth to one-half longer than combined funicle segments.

Mandibles bidentate, the upper tooth slightly the longer and larger.

Pronotum, mesoscutum, axillae and scutellum with reticulate microsculpture very fine to rather fine, beset with moderate piliferous punctures that are separated by rather more to rather less than their own diameters. Propodeum with spiracles large, broad-oval.

Fore wings much as described for *brasiliensis* (Mercet), but with hyaline streak usually sharper: costal cell occasionally bearing only two rows of rather strong hairs, which may merge in apical quarter.

Head blue-green, overspread in region of ocelli with bright, pale bronzy merging to red-violet above and beside the facial impression on the ridges, almost blue in the punctures: facial impression blue-green to brassy green, the mouth region more bronzy: genae dull blue-green with weak reflections. Pronotum, mesoscutum, axillae, scutellum and tegulae dull blue-green,

which is scarcely discernible beneath the overspread of purplish-bronzy reflection. Pleura, propodeum and gaster brownish black to blackish brown, with bright reflections, blue-green in region of propodeal spiracles and sometimes on gaster above. Antennal scape very broadly above and below blackish with metallic reflections, yellow-testaceous along middle in about apical half, and more or less broadly at apex: pedicellus except at extreme apex and club brownish black, the pedicellus green above: pedicellus at extreme apex and funicle yellow-testaceous, the first four funicle segments somewhat darkened above: the sixth funicle segment sometimes, like the club, brownish black, and rarely the fifth also darkened. Leg colour as described for *brasiliensis* (Mercet), but in one series the mid and hind femora are paler and more extensively so.

Redescribed from the following material. BRAZIL: São Paulo, Garuja, 5 ♀, vii. 1935, "ex *Pseudococcus* sp. 16" (*E. Hambleton*); São Paulo, 2 ♀, viii. 1935, "ex *Pseudococcus* sp. 15" (*E. Hambleton*); Campinas, 7 ♀, ii. 1936, "ex *Pseudococcus* sp. 12" (*E. Hambleton*). COLOMBIA: Barbosa, 6 ♀, x. 1935, ex *Pseudococcus* sp. (*E. G. Salas*) (paratypes of *colombiensis* Comp.); Bucaramanga, 5 ♀, ix. 1935, ex *Pseudococcus* sp. (*E. G. Salas*); River Vaupes, 7 ♀, x-xii. 1952, "ex Coccid D 334", 1 ♀, x-xii. 1952, "ex Coccid D 257 on pineapple" (*D. J. Taylor*). PANAMA: Canal Zone, Paraiso, 2 ♀, 20.i. 1911 (*A. Busck*); Montelirio, 1 ♀, 17.iv. 1924, unlocalized, 2 ♀, iii. 1924 (*D. T. Fullaway*); Barro Colorado, 1 ♀, vi. 1941, on *Heliconia marina* (*J. Zetek*). TRINIDAD: Maracas, 3 ♀, x. 1949, ex *Dysmicoccus brevipes* (Ckll.) on cacao pod (*T. W. Kirkpatrick*), (holotype and paratypes of *theobromae* Kerrich), 5 ♀, 6.ix. 1953, same locality and host data (*F. D. Bennett*). Material in U.S. National Museum, in Citrus Experiment Station, Riverside and in British Museum (Natural History).

Compere (1937) described *colombiensis* as a species differing only in colour from the two series of *cariocus* he then had. From a study of the greater number of series now available, I consider these colour differences not to have significance. In particular I find that some qualities of metallic coloration are revealed by a mixture of moderate artificial light and good daylight, whereas they may be obscured by stronger artificial light which penetrates to the melanin. It is apparent that in some other species with the antennal funicle partly yellow, one more funicle segment than is usual may be dark. Consequently I place *colombiensis* as a straight synonym of *cariocus*. Dr. B. D. Burks, after studying the two types in comparison with specimens from several of the above series and with reference to my manuscripts, has expressed agreement with this synonymy.

In 1953 I described, as a new species *theobromae*, a form that appeared to differ from *cariocus* Comp. in four structural and two colour key characters. It should be noted that the frontovertex was described as having six rows of punctures at narrowest, but that these six include the orbital punctures which are exceptionally large in that series of specimens (Text-fig. 68). This form has the head, seen from above, over half as long as broad, the punctuation of the mesoscutum relatively coarse, the frontovertex more obviously green, the antennal scape with relatively little dark marking, the antennal club relatively swollen, and the propodeal spiracles relatively large. Prolonged study, however, of the type series and another series, in conjunction with the numerous series previously placed as *cariocus* Comp., lead me to regard this as a form of *cariocus* exhibiting extremes of variation in several respects. I cannot now maintain it as a distinct species.

This species is so variable that it seems possible that *brasiliensis* (Mercet) is another aberrant form of it.

H. Compere has recognized *Blepyrus tachigaliae* Brues as belonging to the genus *Aenasius*, and specimens that I place as *cariocus* have been determined as *tachigaliae* by D. T. Fullaway, A. B. Gahan and B. D. Burks. I would think it premature, however, to accept this as definite synonymy before the type has been re-examined. The type is not in the U.S. National Museum, and cannot be traced in the American Museum of Natural History, the collection of the New York Zoological Society, or the Museum of Comparative Zoology, Harvard.

Aenasius brethesi De Santis

(Text-figs. 87-88)

1964 [1963] *Aenasius brethesi* De Santis, *An. Conn. Invest. cient. Prov. Bs Aires* 4: 255, 257-60.

Head from above broad, median length to breadth = 1 : 2.2; frontovertex to total breadth = 1 : 3.9, with ocelli in a right-angled triangle; in side view almost regularly rounded: cheeks of moderate length and well rounded: facial impression over a third the height of head. Frontovertex with reticulate microsculpture fine, with orbital piliferous punctures small, and at narrowest with four rows of large punctures between them: facial impression broad and nowhere sharply bordered, about two-fifths height of head, the large punctures descending only a short way below its upper margin (Text-fig. 87).

Mandibles (De Santis, fig. 124) bidentate.

Antenna (according to measurements cited and fig. 122) with scape 3.9 times length of its greatest breadth, broadest well beyond middle; with pedicellus twice length of its greatest breadth; with funicle segments short cup-shaped, the sixth twice as broad as long: [club incomplete].

Reticulate microsculpture on mesoscutum and axillae rather fine, on scutellum of moderate strength: these sclerites beset with moderate piliferous punctures that mostly are separated by rather more than their own diameters.

Fore wing with lower part of outer margin strongly curved and with anal angle regularly rounded: radial straight in basal two-thirds, then curved, and sharply pointed at apex, the postmarginal clearly extending beyond its tip (Text-fig. 88): hyaline streak absent: costal cell bearing three rows of strong hairs, merging to two in about apical third.

Head dull blue-green with occasional patches of bronzy reflection, on facial impression merging to more strongly bronzy below. Pronotum, mesoscutum, axillae and scutellum dull blue-green, with bronzy reflection especially at sides. Pleura and propodeum blackish brown, and gaster brownish black, with weak reflections. Legs brownish black, with bright reflections, merging to dull testaceous.

Holotype ♀. ARGENTINA: Buenos Aires, Delta del Parana, 25.i.1908 (*J. Brèthes*).

I wish to express my gratitude to Dr. Manuel J. Viana for according me the loan of this type from the collection of the Museo Argentino de Ciencias Naturales "Bernadino Rivadavia", Buenos Aires. This has enabled me to make direct comparison between the species and its closer relatives. I have not, however, seen the antennae, mandibles and right wings, which had been dissected off for illustration.

Aenasius bolowi Mercet

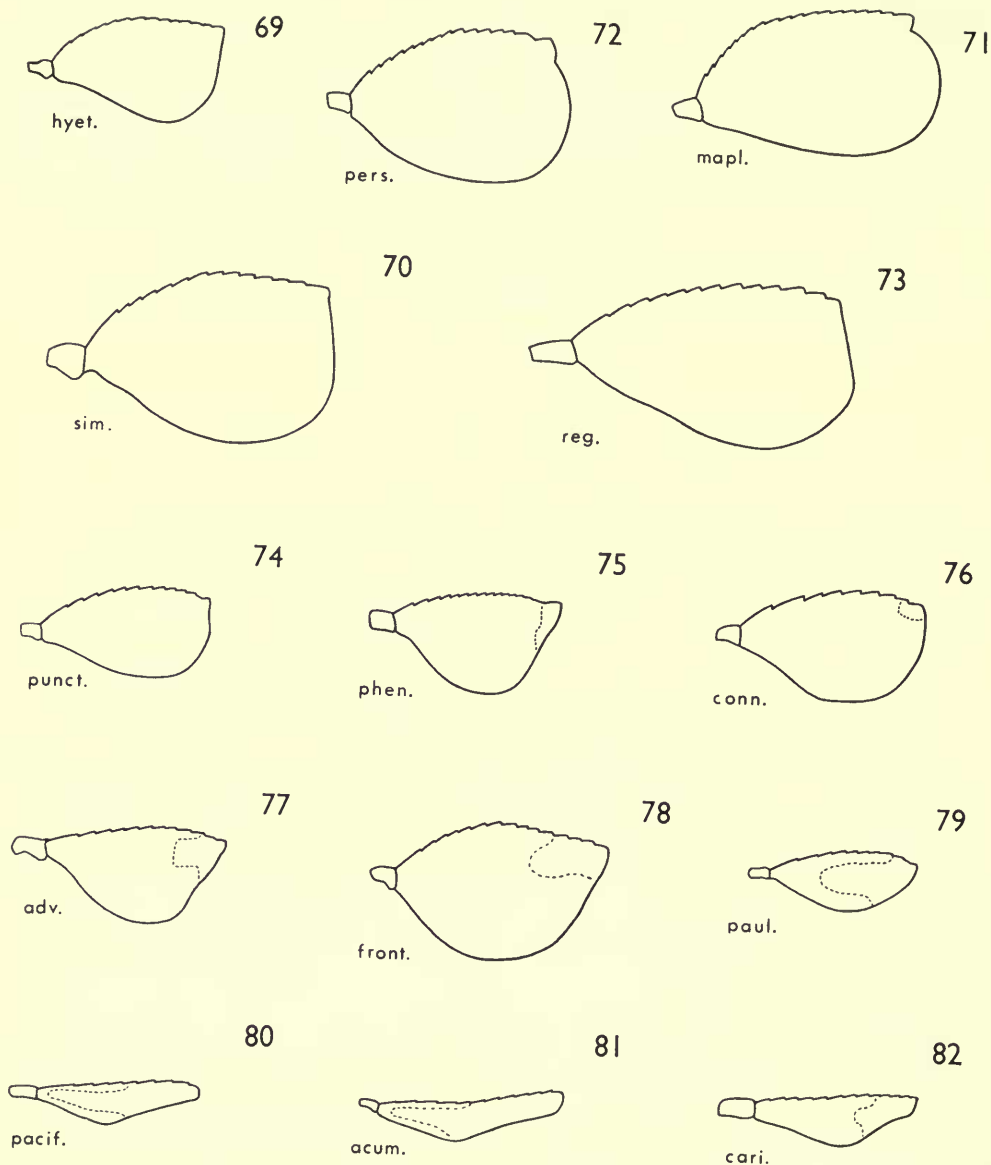
1928 *Aenasius* sp. Mercet, *Eos* 4: 11-12.

1947 *Aenasius bolowi* Mercet, *Revta R. Acad. Cienc. exact. fis. nat. Madr.* 41: 466-7, **species dubium**.

This species was validated in a paper consisting of manuscript descriptions pieced together and published 14 years after their distinguished author's death. The description of *Aenasius bolowi* was evidently based on a specimen that Mercet had for study, and referred to but did not validate in a paper published in 1928. Unluckily this specimen cannot be traced in the Madrid museum at this time, nor is it in the Zoologisches Museum der Universität, Berlin or the Deutsches Entomologisches Institut. The description does not appear to fit any species of *Aenasius* treated in the present paper, and it is possible that *Aen. bolowi* belongs to some other, similar genus.

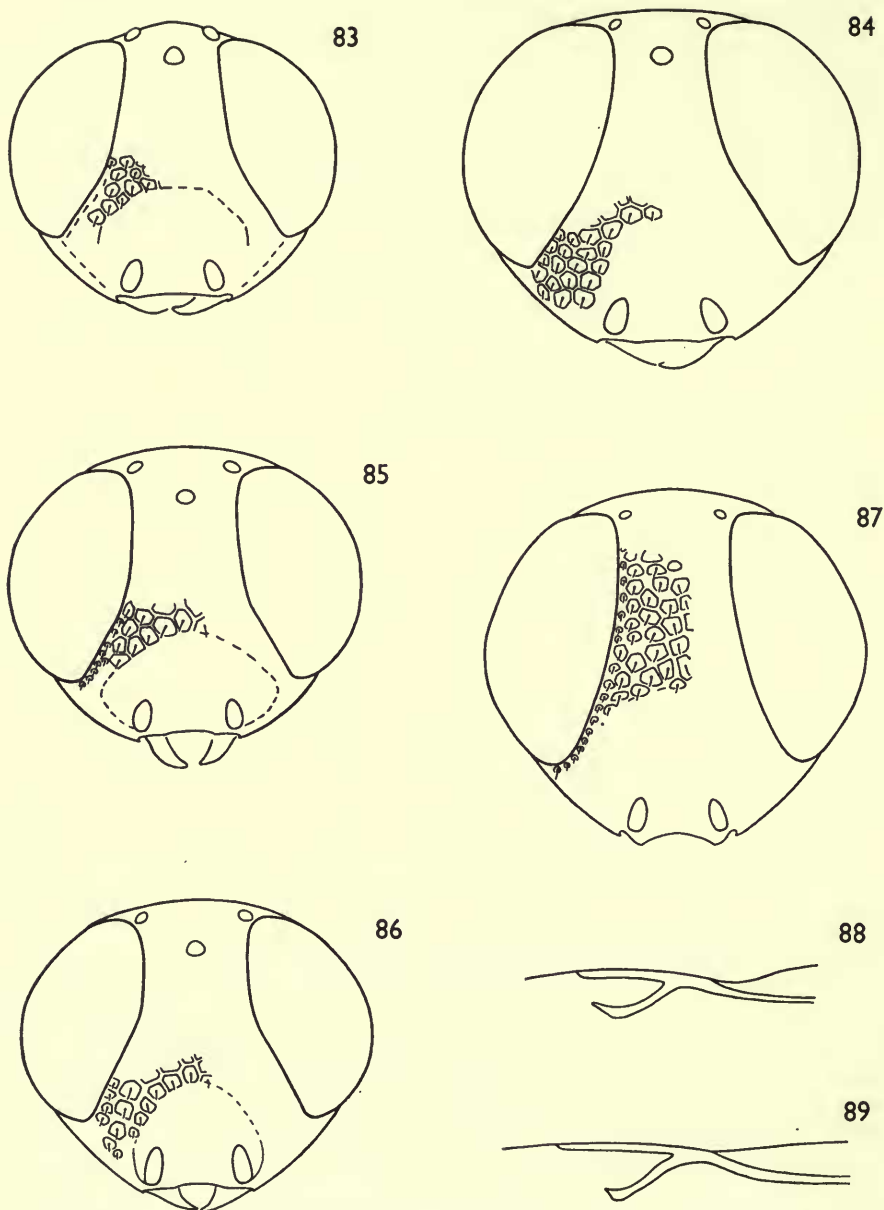
KEY TO SPECIES OF *AENASIUS* WALKER: FEMALES

- 1 Antennal scape expanded into a broad lamina, only about one and one-third times to about twice length of its greatest breadth (Text-figs. 69-78): mandibles bidentate
Antennal scape less strongly laminate, at least $2\frac{1}{2}$ times length of its greatest breadth (Text-figs. 79-82): mandibles bidentate, in two species obscurely tridentate 2
16
- 2 Antennal funicle blackish brown to brownish black, with weak metallic reflections, the first 4 or 5 segments very broad, rather saucer-shaped 2
Antennal funicle with at least two segments pale yellow-testaceous, the segments usually short-cylindrical, none more than about 3 times as broad as long [in one species in which the first three are saucer-shaped the wing margin is sharply incised at apex of the sub-parallel costal cell] 13
- 3 Fore wing with a hyaline streak running from tip of radial to tip of postmarginal (Compere, 1937, fig. 3, *longiscapus* and others), with lower part of outer margin less strongly curved and with anal angle less rounded: facial impression bordered by a distinct keel at least at sides 4
Fore wing without such streak (Compere, 1937, fig. 3, *punctatus* and others), with outer margin distinctly to strongly curved and with anal angle well rounded: facial impression not bordered by a distinct keel at sides and seldom above 9
- 4 Facial impression also bordered by a distinct keel above (almost as distinct as in *frontalis* Comp.), the face distinctly angled in this position: punctuation of frontovertex relatively shallow: lamina of antennal scape not bulging outward at apex (Text-figs. 69 and 70): fore wing with outer margin distinctly a little curved and with anal angle moderately rounded 5
Facial impression bordered by distinct keels at sides but not above: punctuation of frontovertex deep: lamina of antennal scape bulging outward at apex (Text-figs. 71-73): fore wings with lower part of outer margin almost straight and with anal angle relatively sharp 6
- 5 Antennal scape three-quarters longer than its greatest breadth, the lamina curving inward from apex (Text-fig. 69): antennal club longer than the combined funicle segments *hyettus* Walker
Antennal scape one-half longer than its greatest breadth, the lamina falling almost vertically at apex (Text-fig. 70): antennal club shorter than the combined funicle segments *similis* sp. n.



FIGS. 69-82. *Aenasius* species, females. Left antennal scape, in dextro-lateral view, of 69, *Aen. hyettus* Walk.; 70, *Aen. similis* sp. n.; 71, *Aen. maplei* Comp.; 72, *Aen. personatus* sp. n.; 73, *Aen. regularis* sp. n.; 74, *Aen. punctatus* Comp.; 75, *Aen. phenacocci* Bennett; 76, *Aen. connectens* sp. n.; 77, *Aen. advena* Comp.; 78, *Aen. frontalis* Comp.; 79, *Aen. paulistus* Comp.; 80, *Aen. pacificus* Comp.; 81, *Aen. acuminatus* sp. n. and 82, *Aen. cariocus* Comp.

- 6 Frontovortex relatively broad, nearly a third the total head width, with ocelli in a slightly obtuse triangle (95°) (Text-fig. 55), antennal scape not or but little broader than the frontovortex: frons rather prominent, the facial impression rather deep as seen from above, the head in side view bent round rather sharply to mouth region (Text-fig. 62) *maplei* Compere
- Frontovortex less than a quarter total head width, with ocelli in a decidedly acute triangle ($65-70^\circ$) (Text-figs. 56-57), antennal scape much broader than the frontovortex: frons less prominent, the facial impression appearing less deep from above, the head in side view more evenly curved, less sharply bent round to mouth region 7
- 7 Antennal scape (Text-fig. 72) very broad, about one-third longer (dorsally) than its greatest breadth: head from above moderately broad (Text-fig. 56) . . . *personatus* sp. n.
- Antennal scape (Text-fig. 73) about three-fifths longer (dorsally) than its greatest breadth: head from above mostly broader (Text-fig. 57) 8
- 8 Mesoscutum beset with shallow but well-defined piliferous punctures that mostly are separated by less than their own diameters: fore wing with radial vein only slightly curved: head and thorax usually with much red-violet . . . *caeruleus* Brues
- Antennal club nearly twice as long as combined funicle segments: mesoscutum beset with rather small and ill-defined piliferous punctures that are separated by much more than their own diameters: fore wing with radial vein distinctly curved: head and thorax with little red-violet *regularis* sp. n.
- 9 Head, pro- and mesothorax, and to a lesser extent metathorax, propodeum and sides of gaster with reticulate microsculpture very strong and regular, giving the species a velvety appearance: antennae with scape twice as long (dorsally) as its greatest breadth, the lamina bulging very slightly outward at apex (Text-fig. 74): wings with prebasal area regularly beset with hairs which are not so much larger than those on postbasal, and do not tend so much to be in distinct rows as in other species . . . *punctatus* Compere
- Not as above: antennal scape about one-half longer than its greatest breadth, with lamina, except in the next species, curving inward from apex 10
- 10 Facial impression bordered by a sharp keel above but not at sides: head in side view rather long and strongly curved (Text-fig. 63): lamina of antennal scape bulging outward slightly at apex: postmarginal extending beyond tip of uncus: costal cell bearing two rows of strong hairs *vexans* sp. n.
- Facial impression not bordered by a distinct keel above or at sides: head in side view shorter: lamina of antennal scape curving inward from apex (Text-fig. 75): postmarginal not reaching level of tip of uncus: costal cell bearing three or four rows of strong hairs 11
- 11 Head from above moderately long, median length to breadth = 1:1.7 to 2.0: reticulation on frontovortex, mesoscutum and scutellum very fine: propodeal spiracles broad-oval to sub-circular and large: mid tibiae pale testaceous-brown . . . *phenacocci* Bennett
- Head from above decidedly broad, median length to breadth = 1:2.0 to 2.4: reticulation on mesoscutum and scutellum of at least moderate strength: propodeal spiracles transverse-oval, not abnormally large: mid tibiae usually blackish brown to brownish black, sometimes paler 12
- 12 Punctuation of frontovortex (as in *phenacocci*) relatively shallow and rather regular: greatest width of scape about equal to narrowest width of frontovortex: antennal club only slightly longer than combined funicle segments: head with little red-violet *flandersi* sp. n.
- Punctuation of frontovortex deeper and less regular: greatest width of scape about $1\frac{1}{2}$ times narrowest width of frontovortex: antennal club about one-half longer than combined funicle segments: head with much red-violet . . . *masii* Domenichini
- 13 Costal cell sub-parallel almost to apex, where the wing margin is sharply incised: antennal scape with lamina falling almost vertically from apex (Text-fig. 76):



FIGS. 83-87. *Aenasius* species, females. Head, in facial view, of 83, *Aen. connectens* sp. n. ; 84, *Aen. advena* Comp. ; 85, *Aen. paulistus* Comp. ; 86, *Aen. pacificus* Comp. and 87, *Aen. brethesi* De S.

FIGS. 88-89. Part of left fore-wing of 88, *Aenasius brethesi* De S. and 89, *Blephyrus clavicornis* (Comp.).

- head in side view (Text-fig. 64) neither so evenly curved as in *advena* Comp. nor so sharply bent round as in *frontalis* Comp. (Text-figs. 65 and 66): facial impression decidedly broad (Text-fig. 83), bordered by a distinct keel above but not at sides: one to two rows of large punctures descend between the eye and facial impression, and do not nearly reach the malar line: postmarginal vein clearly extending beyond tip of uncus: [hyaline streak absent] **connectens** sp. n.
- Costal cell distinctly tapered to apex, where the wing margin is not sharply incised: antennal scape with lamina curving well inward from apex: head in side view (see Text-figs. 65 and 66 and following couplet): facial impression less broad, either not bordered by a distinct keel or bordered by a sharp keel above and at sides: two to three rows of large punctures descend between eye and facial impression, and nearly reach the malar line: postmarginal vein not reaching tip of uncus 14
- 14 Head from above decidedly broad, about twice or more as broad as long, with frontal emargination shallow; in side view rather evenly curved to mouth (Text-fig. 65): frontovertex hardly shining, about one-fifth the total head width: facial impression narrow above (Text-fig. 84), not bordered by a distinct keel: fore wings with lower part of outer margin moderately curved: hyaline streak absent *advena* Compere
- a. Head blue-green, in large part with brassy reflections, around median ocellus more coppery and golden: antennae with club and last two funicle segments blackish brown type form
- b. Head dominantly red-violet above, blue-green near the median ocellus (but intermediates are now known) var. **ianthinus** Compere
- c. Small specimens: antennae with scape twice or just over twice as long as its greatest breadth and with whole funicle a rich yellow-testaceous: U.S.A., Florida var.
- Head from above elongate, much less than twice as broad as long, with frontal emargination deep (Text-fig. 67); in side view (Text-fig. 66) seen to be falling forward and then bent round at about a right angle to mouth region: frontovertex strongly shining; about a quarter the total head width: facial impression less narrow above, bordered by a sharp keel above and at sides: fore wings with lower part of outer margin slightly emarginate: hyaline streak present 15
- 15 Frontovertex between a fifth and a quarter the total head breadth: mesoscutum with relatively fine, transversely lineolate microsculpture: legs, except coxae and trochanters, mainly testaceous **frontalis** Compere
- Frontovertex one-third the total head breadth: mesoscutum shagreened between the punctures: legs blackish, with only the tarsi paler **chapadae** Ashmead
- 16 Antennal scape two and a half to less than three times as long as broad, and shaped as in Text-fig. 79: fore wing rather sharply incised at apex of costal cell, without a definite hyaline streak, and with postmarginal extending beyond tip of radius: facial impression broad, the large punctures not descending far below its upper margin (Text-fig. 85): mandibles obscurely tridentate 17
- Antennal scape at least about three times as long as broad and shaped differently (Text-figs. 80-82): fore wing not sharply incised at apex of radial cell: except in *brethesi* De S., fore wing with a hyaline streak and with postmarginal not extending as far as tip of radius, and facial impression less broad, the large punctures descending much further: mandibles bidentate 18
- 17 Cheeks and large punctures as in Text-fig. 85: large punctures on frontovertex of fully normal depth: piliferous punctures on mesoscutum regular and relatively deep, mostly separated by about or rather less than their own diameters, on scutellum not inconspicuous; propodeum with spiracles large, very broad-oval: fore wing with infuscation fading out towards outer margin: antennal club blackish brown with green metallic reflections: tarsi pale testaceous, darkened at apex: Brazil **paulistus** Compere

- Cheeks more rounded, and large punctures descending even less far below upper margin of facial impression: large punctures on frontovertex relatively shallow; piliferous punctures on mesoscutum rather shallower and mostly separated by more than their own diameters, on scutellum rather inconspicuous: propodeum with spiracles transverse-oval, not abnormally large: fore wing with infuscation curving outward from apex of radial vein, leaving the wing very broadly hyaline by outer margin: antennal club largely dull yellow-testaceous, blackish brown near base: tarsi rather darker: islands of Mexico *insularis* Compere
- 18 Fore wing shape much as in *frontalis* Comp., relatively rather narrow, with lower part of outer margin slightly emarginate and with anal angle relatively sharp: cheeks usually short, sharply narrowed, and facial impression relatively small, not more than about a third the height of head (Text-fig. 86) 19
- Fore wings broader, with lower part of outer margin curved gently outward, and with anal angle more rounded: cheeks longer and less narrowed, and facial impression relatively large, about two-fifths or more the height of head 23
- 19 Frontovertex at narrowest well over a quarter the total head breadth: ocelli in about a right angled or slightly obtuse triangle: punctures on mesoscutum separated by less than their own diameters 20
- Frontovertex at narrowest a quarter or less the total head breadth: ocelli in a decidedly acute triangle: punctures on mesoscutum mostly separated by rather more than their own diameters 22
- 20 Head, seen from above, with orbital piliferous punctures strong, and with larger punctures in a loose reticulation: inter-scorbal prominence visible when the head is viewed from above; mesoscutum conspicuously bright green, markedly shining (though less strongly so than the frontovertex), and with punctation notably sharp: U.S.A. *nitens* sp. n.
- Head, seen from above, with orbital piliferous punctures not strong, and with larger punctures in a close reticulation: inter-scorbal prominence not visible when the head is viewed from above: mesoscutum dull blue-green showing weakly through the rather bronzy reflection, not markedly shining, the microsculpture stronger, and with punctation not notably sharp 21
- 21 Frontovertex not especially shining, the dull blue-green coloration largely overspread, with punctures rather shallow: head in side view rather short, evenly curved round to mouth: antennal scape 3 to $3\frac{1}{2}$ times length of its greatest breadth, broadest just before middle (Text-fig. 80): antennal club equal in length to pedicellus and funicle combined *pacificus* Compere
- Frontovertex decidedly shining and more conspicuously green, with punctures of normal depth: head in side view rather longer, bent round rather sharply from sides of facial impression: antennal scape nearly 4 times length of its greatest breadth, broadest just beyond basal third: antennal club longer than pedicellus and funicle combined *longiscapus* Compere
- 22 Frontovertex with punctures relatively very shallow: cheeks very short, narrowed at well over half a right angle: two rows of large punctures and the orbitals descend between eye and facial impression, and reach just below bottom of eye: antenna with scape just over 3 times, and club about $1\frac{1}{2}$ times, length of its greatest breadth: punctures on mesoscutum and scutellum very shallow, mostly separated by much more than their own diameters *vadosus* sp. n.
- Frontovertex with punctures of normal depth: cheeks longer, narrowed at less than half a right angle: three rows of large punctures and the orbitals descend between eye and facial impression, and reach well below bottom of eye: antenna with scape (Text-fig. 81) 5 times, and club $2\frac{1}{2}$ times, length of its greatest breadth: punctures on mesoscutum and scutellum not exceptionally shallow, mostly separated by little more than their own diameters except near apex of scutellum *acuminatus* sp. n.

- 23 Facial impression broad, the large punctures descending only a little way below its upper margin (Text-fig. 87): sixth funicle segment $2\frac{1}{2}$ times as broad as long: fore wing with hyaline streak absent, with radius emitted at a relatively acute angle and straight in basal two-thirds, the postmarginal clearly extending beyond tip of uncus (Text-fig. 88): frontovertex and mesonotum very conspicuously dull blue-green: Argentina **brethesi** De Santis
- Facial impression less broad, the large punctures descending to about bottom of eye: sixth funicle segment not quite twice as broad as long: fore wing with hyaline streak present, with radius emitted at well over 45° and strongly curved, the postmarginal clearly not reaching level of tip of uncus: frontovertex and mesonotum with blue-green coloration mainly overspread 24
- 24 Antennal scape almost 4 times length of its greatest breadth, broadest just before middle: facial impression relatively shallow, almost half height of head: mesoscutum with moderate, rather deep, clear-cut punctures that are smaller than the coarse but shallower punctures on the middle of the scutellum (but this character is not especially obvious) **brasiliensis** (Mercet)
- Antennal scape (Text-fig. 82) not more than about $3\frac{1}{2}$ times length of its greatest breadth: facial impression of normal depth and somewhat smaller: punctures on scutellum not coarser than those on mesoscutum **cariocus** Compere

BLEPYRUS Howard, 1898

1898 *Blepyrus* Howard, *Proc. U.S. natn. Mus.* **21**: 233-4.

1922 *Blepyrus* Howard; Timberlake, *Proc. Hawaii. ent. Soc.* **5**: 168-70.

Blepyrus clavicornis (Compere) **comb. n.**

(Text-figs. 89, 90, 92)

1939 *Ericydnus clavicornis* Compere, *Univ. Calif. Publ. Ent.* **7** (4): 62-3.

Head from above with median length to breadth = 1:2.1; frontovertex to total breadth = 1:4.6 to 4.9, with ocelli in an acute triangle; in side view curved rather evenly to mouth: cheeks rather long, strongly curved (Text-fig. 90): facial impression shallow and not sharply bordered, nearly half height of head. Frontovertex with reticulate microsculpture regular and of moderate strength, with orbital piliferous punctures small, and at narrowest with four rows of large punctures between them: large punctures descending between eye and facial impression rather scattered below. Piliferous punctures in malar area moderate.

Mandibles bidentate, the upper tooth somewhat the larger and longer.

Antenna (see Compere, 1939, fig. 3) with scape hardly expanded beneath, seven times length of its greatest breadth; with pedicellus twice length of its greatest breadth; with funicle segments cup-shaped to short cylindrical, the sixth 1.4 times as broad as long: club a little longer than combined funicle segments and with sutures very oblique.

Mesoscutum with reticulate microsculpture rather strong, beset with shallow piliferous punctures that mostly are separated by less than their own diameters. Axillae and scutellum with microsculpture finer and much more outstanding, giving these sclerites a duller appearance: piliferous punctures fine: scutellum quite sharply pointed at apex (Text-fig. 92).

Fore wings relatively elongate, with outer margin and anal angle well rounded: marginal vein about half length of radial, the latter emitted at an angle of about 45° (Text-fig. 89): costal cell bearing four rows of hairs on upper surface.

Head blue-green to blue, on frontovertex with much red-violet, and below that with slight infusion of red-violet to bronzy. Mesoscutum, except peripherally, strongly red-violet with some infusion of blue at sides: otherwise the dorsum of thorax is a fundamental blue-green to blue, mainly overspread with dull red-violet to bronzy reflections. Mesopleura, propodeum

above and gaster blackish with weak reflections, but sides of propodeum conspicuously blue-green. Antennal scape yellow: pedicellus and flagellum brownish black, with weak green reflections. Legs blackish at base to brownish, with weak reflections, the hind tibiae paler in apical third: fore and mid tibiae in apical two-thirds, and all tarsi yellow.

Redescribed from two paratypes. BRAZIL.

Blepyrus insularis (Cameron)

(Text-figs. 91, 93)

1886 *Encyrtus? insularis* Cameron, *Mem. Proc. Manchr. lit. phil. Soc.* (3) 10: 243-5.

1922 *Blepyrus insularis* (Cameron); Timberlake, *Proc. Hawaii. ent. Soc.* 5: 167-73.

1945 *Clausenia saissetiae* Yasumatsu & Yoshimura, *Mushi* 16: 31-2, syn. n.

Head from above with median length to breadth 1: 1.9 to 2.3; frontovertex to total breadth = 1: 3.6 to 4.8, with ocelli in an acute triangle; in side view curved very evenly: cheeks short and sharply narrowed though strongly curved (Text-fig. 91): facial impression shallow and not sharply margined, nearly half height of head. Frontovertex with reticulate microsculpture regular and of moderate strength, with orbital piliferous punctures small but regular, and at narrowest with five rows of large punctures, which are rather shallow, between them: one row of large punctures, diminishing in size from above, descends obscurely between eye and facial impression. Piliferous punctures in malar area rather fine.

Mandibles tridentate, all teeth sharp, the middle one much the longest.

Antenna (see Timberlake, 1922, fig. 1) with scape very little expanded beneath, five to six times length of its greatest breadth; with pedicellus twice length of its greatest breadth; with funicle segments saucer-shaped, and club more than one-half longer than the combined funicle segments.

Dorsum of thorax with reticulate microsculpture fine, that on axillae and scutellum little more outstanding than that on mesoscutum. Piliferous punctures on mesoscutum and axillae of moderate depth, mostly separated by less than their own diameters, those on scutellum finer, mostly separated by more than their own diameters: scutellum less pointed than in *clavicornis* (Comp.) and axillae more widely separated (Text-fig. 93).

Fore wings as described for *clavicornis* Comp., but radial emitted at a slightly acuter angle: costal cell bearing three rows of hairs on upper surface, rather broadly glabrous next the submarginal vein.

Head a fundamental dull blue-green overspread, usually in greater part, with dull red-violet and bronzy. Dorsum of thorax a fundamental blue-green showing weakly through the reflection, which normally is very conspicuously red-violet on mesoscutum, pale bronzy on scutellum. Mesopleura, propodeum, and gaster in greater part, blackish with bright reflection, the gaster conspicuously blue-green near base above. Antennal scape yellow to yellow-testaceous; pedicellus and flagellum dull testaceous below, and pale brown with weak greenish reflections above. Coxae, trochanters, fore femora wholly, and mid and hind femora in about basal half, blackish with weak reflections: legs otherwise yellow-testaceous except that the mid femora are dull brown in apical half and the mid tibiae strongly infuscate in basal half.

Redescribed from the following. HAWAIIAN IS.: Honolulu, 6 ♀, 2-5.iv.1916, *ex Ferrisia virgata* (Ckll.) (*P. H. Timberlake*). MARIANNA IS.: Saipan, 1 ♀, 12.v.1940, on *Terminalia* sp. supposedly *ex Saissetia* sp. (*K. Yasumatsu & S. Yoshimura*), (type of *saissetiae* Yasu. & Yoshi.). PAPUA: Milne Bay, 3 ♀, 12.x.1958, *ex ?Planococcus citri* (Risso) on coffee (*W. C. Dormer*). SARAWAK: 10 ♀, *ex mealybug* (*C. R. Wallace*). MALAYA: Selangor, 1 ♀, viii.1948 (no further data), 1 ♀, vi.1951, "*ex ovisac of Pulvinaria maxima*", 1 ♀, ii.1952, *ex F. virgata* (Ckll.), per *Rubber Research Institute*; Selangor, Kuala Lumpur, 4 ♀, 24.iv.1956, per *Department of*

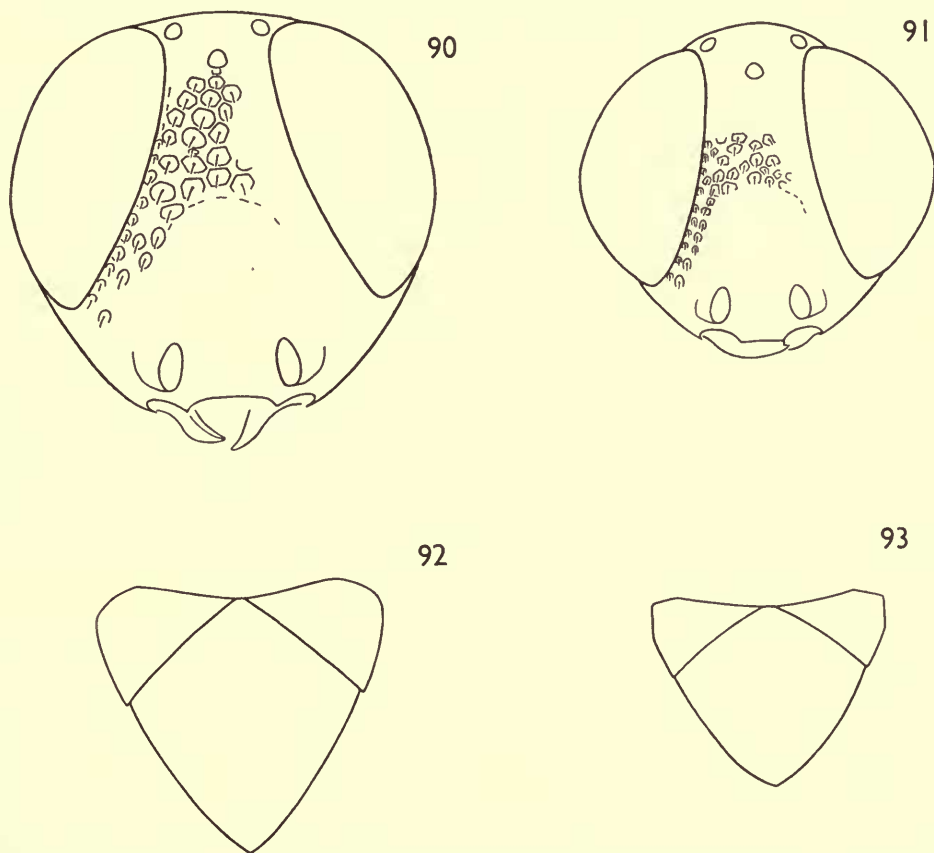
Agriculture. CEYLON: Peradeniya, 3 ♀, 20.v.1954, ex *F. virgata* (Ckll.) per *Department of Agriculture.* INDIA: Madras, 1 ♀, 4.ii.1958, ex mealybug on guava, per *V. P. Rao.* NIGERIA: Ibadan, 3 ♀, viii.1954, ex *F. virgata* (Ckll.) on *Theobroma cacao*, 3 ♀, viii.1954 on *Gliricidia* sp. (*R. G. Donald*). Much of this material in British Museum (Natural History).

The mount which bore the Cameron type specimen is in the British Museum (Natural History), but the type specimen, which was examined by J. Waterston, is now missing.

This species is evidently a tropicopolitan parasite of *Ferrisia virgata* (Ckll.).

KEY TO THE SPECIES OF *BLEPYRUS* Howard : FEMALES

- A. Cheeks rather long (Text-fig. 90): antennal scape seven times length of its greatest breadth: funicle segments cup-shaped to short-cylindrical: mandibles bidentate: scutellum more pointed than in alternate (Text-fig. 92), and much less shining than mesoscutum: costal cell bearing four rows of hairs on upper surface: flagellum brownish black: hind tibiae considerably darkened . . . *clavicornis* (Compere)



FIGS. 90-93. *Blepyrus* species, females. 90-91. Head, in facial view, of 90, *B. clavicornis* (Comp.) and 91, *B. insularis* (Cam.). 92-93. Scutellum and axillae of 92, *B. clavicornis* (Comp.) and 93, *B. insularis* (Cam.).

- B. Cheeks much shorter (Text-fig. 91): antennal scape five to six times length of its greatest breadth: funicle segments saucer-shaped: mandibles tridentate: scutellum less pointed than in alternate (Text-fig. 93), and little less shining than mesoscutum: costal cell bearing three rows of hairs on upper surface: flagellum pale brown: hind tibiae yellow-testaceous *insularis* (Cameron)

Species incorrectly placed in *Blepypyrus* Howard

Blepypyrus tachigaliae Brues, 1921 is discussed in the present work (pp. 216-8).

Blepypyrus saccharicola Gahan, 1942 is treated in the present work (p. 237).

NEODISCODES Compere, 1931

1931 *Neodiscodes* Compere, *Univ. Calif. Publ. Ent.* **5** (14) : 272-4.

1939 *Neodiscodes* Compere; Compere, *Bull. ent. Res.* **30** (1) : 24.

1953 *Neodiscodes* Compere; Kerrich, *Bull. ent. Res.* **44** (4) : 793 *ex parte*.

In this study of the genus, seven species are recognized; but they are closely related, and only two are represented by long series, so that the range of variation in other cases has yet to be determined.

Compere (1939) examined two specimens in a rearing from *Pseudococcus* sp. on Kei Apple in Kenya, but did not consider them distinct from the type species. One of these specimens was deposited in the British Museum collection and Kerrich (1953) did consider it specifically distinct but did not validate it. A further reared series agreeing closely with this specimen having been received, the species is now validated; yet two other specimens show variation in either direction from the form considered as typical.

Neodiscodes parvus sp. n.

Head, seen from above, relatively strongly emarginate behind: median length to breadth about 1 : 1.8; frontovertex to total breadth = 1 : 4.5, with median ocellus one and a half times its own diameter from orbital margin: in side view relatively long, relatively much longer than in *lepellei* Kerrich (cf. Text-fig. 96); in facial view with cheeks well rounded. Frontovertex with reticulate microsculpture of moderate strength; with orbital piliferous punctures small; with larger punctures between ocelli of moderate strength, rather shallow, but mostly not well separated, those before median ocellus much coarser and deeper, and in a reticulation. Eyes very distinctly and not sparsely hairy ($\times 45$).

Antennal scape 2.5 times length of its greatest breadth.

Mesoscutum with reticulate microsculpture very fine, a little coarser and more outstanding at sides, beset with fine, rather sparse, piliferous punctures: axillae and scutellum very similar, but the punctuation still sparser. Scutellum narrowly rounded at apex.

Fore wing twice length of its greatest breadth, with outer margin moderately curved and with anal angle well rounded: radius emitted at an angle of about 45° , decidedly expanded from base and moderately curved, with a long uncus that does not extend nearly as far as apex of postmarginal.

Head deep blue-green, with dull bronzy reflections strong on frontovertex, weak on facial area. Thorax above a fundamental dull blue-green, overspread with weak bronzy reflection. Pleura, propodeum and gaster blackish brown, with weak bronzy reflection and some blue-green on first large tergite. Antennae blackish brown, with metallic reflections weak to moderate: pedicellus narrowly paler at apex. Legs brownish black, the mid and hind femora and tibiae very largely a rather pale brown: tarsi stramineous, pale brown at segmental apices.

Holotype ♀. CHINA: Hunan, 11.vii.1949, "ex A524", Djou coll.

Paratype. 1 ♀ "shipment no. A211".

Holotype in British Museum (Natural History): paratype in Citrus Experiment Station, Riverside. Two males have similar data to the holotype, and one is to be deposited in each institution.

Neodiscodes comperei sp. n.

(Text-fig. 94)

1953 *Neodiscodes* sp. Kerrich, *Bull. ent. Res.* **44**: 795-6.

Head, seen from above (Text-fig. 94), relatively long, with median length to breadth = 1 : 1.5 to 1.9; frontovertex to total breadth = 1 : 5.5, with median ocellus one and a half times its own diameter from orbital margin: in side view relatively long, sharply curved; in facial view with cheeks weakly rounded. Frontovertex with reticulate microsculpture of moderate strength; with orbital piliferous punctures very small but not minute; having larger punctures between ocelli of moderate strength with some wide interspaces, those just before median ocellus scarcely larger and denser, but increasing in size and density forwards so as normally to form a reticulation above the facial area (Text-fig. 94). Eyes weakly and rather sparsely hairy ($\times 45$).

Antennal scape 2.6 times length of its greatest breadth.

Mesoscutum with reticulate microsculpture fine in middle and not much more outstanding at sides, beset with piliferous punctures that mostly are separated by less than their own diameters in middle, and are not much smaller and sparser at sides. Axillae and greater part of scutellum with microsculpture a little less fine than on middle of mesoscutum, and with piliferous punctures markedly sparser, mostly separated by much more than their own diameters. Scutellum moderately pointed at apex.

Fore wing two and a quarter times length of its greatest breadth, with outer margin almost straight but with anal angle well rounded: radius emitted at a moderately acute angle, moderately to quite strongly curved, with a long, sharp uncus that extends just beyond apex of postmarginal.

Head a fundamental blue-green, mainly overspread with dull bronzy reflection. Thorax above dull blue-green to steely green. Pleura, propodeum and gaster brownish black, with weak bronzy reflection. Antennae blackish to paler, with weak metallic reflections, the pedicellus paler at apex. Leg colour much as described for *lepellei* Kerrich.

Holotype ♀. SOUTH AFRICA, Cape Province, Addo, ii. 1963, ex *Allococcus quaesitus* (Brain) on citrus (*W. Hannekom*).

Paratypes. KENYA: Nairobi, National Agricultural Laboratory, 1 ♀, 6.iii.1937, ex *Pseudococcus* sp. on Kei Apple (*Albizia* sp.) (*A. R. Melville*) (see Kerrich, 1953). SOUTH AFRICA: 2 ♀ (same data as holotype).

Holotype, and paratype from Kenya, in British Museum (Natural History); paratypes in collection of Department of Agriculture, Pretoria and in United States National Museum.

This species, received in series from Dr. D. P. Annecke and described by the present author, is named in gratitude for the inspiration given to both of us by Dr. H. Compere.

Neodiscodes lepelleyi Kerrich

(Text-fig. 96)

1953 *Neodiscodes lepelleyi* Kerrich, *Bull. ent. Res.* **44** : 794-6.

Head, seen from above, about twice as broad as median length : frontovertex to total breadth about 1 : 8.5, with median ocellus half its own diameter from orbital margin : in side view (Text-fig. 96) relatively short ; in facial view with cheeks moderately rounded. Frontovertex with reticulate microsculpture moderate to rather strong ; with orbital piliferous punctures minute ; having larger punctures between ocelli of moderate strength, mostly with wide interspaces, those before median ocellus larger, becoming coarser and closer just above facial area but mostly well separated. Eyes weakly and rather sparsely hairy ($\times 45$).

Antennal scape 2.6 times length of its greatest breadth.

Mesoscutum with reticulate microsculpture very fine except at sides, where it is a little coarser and considerably more outstanding, beset with piliferous punctures that in middle are mostly separated by a little more than their own diameters, but at sides are much finer and sparser. Axillae similar to middle of mesoscutum. Scutellum duller, the microsculpture less fine : piliferous punctures markedly sparser. Scutellum very bluntly pointed, almost rounded, at apex.

Fore wing twice length of its greatest breadth, with outer margin moderately curved and with anal angle sharply rounded : radius emitted at a very acute angle, almost straight, with a markedly enlarged pterostigma and with uncus not extending quite as far as apex of postmarginal.

Head blue-green, with bronzy reflections on frontovertex strong and more or less extensive, on facial area weak or absent. Thorax above steely green, with some very weak violet reflections when viewed obliquely. Pleura, propodeum and gaster brownish black, with pale bronzy reflection.

Antennae blackish to paler, with weak metallic reflections. Legs blackish brown, the mid and hind femora and tibiae paler in part, least so the hind tibiae : tarsi stramineous, the fore tarsi extensively, the mid and hind tarsi below and at segmental apices, pale brownish.

Redescribed from the following material. CEYLON: Peradeniya, 2 ♀, II.vii.1937 (including holotype), *ex Planococcus lilacinus* (Ckll.), 1 ♀, 5.viii.1937, supposedly *ex Scymnus* sp. (Coccinellidae), (*R. H. Le Pelley*). INDIA: Orissa, Bhubaneswar, 1 ♀, 3.iii.1962, *ex* mealybug on "Paladhua" (*G. N. Das*). Material in British Museum (Natural History) and in Citrus Experiment Station, Riverside.

Neodiscodes martinii Compere

(Text-figs. 97, 99)

1931 *Neodiscodes martinii* Compere, *Univ. Calif. Publ. Ent.* **5** (14) : 273-4.1953 *Neodiscodes martinii* Compere; Kerrich *ex parte*, *Bull. ent. Res.* **44** (4) : 794-6 (excluding fig. 9).

Head, seen from above, with median length to breadth = 1 : 1.8 to 1.9 ; frontovertex to total breadth = about 1 : 5.6, with median ocellus about its own diameter from orbital margin : in side view longer than in *lepelleyi* Kerrich (cf. Text-fig. 96), not sharply curved ; in facial view with cheeks moderately rounded. Frontovertex with reticulate microsculpture of moderate strength ; with orbital piliferous punctures distinct, separated by about their own diameters or less ; with larger punctures between ocelli large, in a loose reticulation, those before median ocellus decidedly larger, reticulate. Eyes moderately strongly hairy, the hairs discernible with difficulty $\times 25$.

Antennal scape 2.2 times length of its greatest breadth.

Mesoscutum with reticulate microsculpture rather fine, moderately finer and more outstanding at sides, beset with piliferous punctures that mostly are separated by less than their own diameters in middle, but are finer and very much sparser at sides. Axillae and scutellum with microsculpture much coarser and more outstanding, with piliferous punctures about equally coarse but rather sparser, mostly separated by more than their own diameters. Scutellum relatively sharply pointed at apex (Text-fig. 99).

Fore wing twice length of its greatest breadth, with outer margin rather strongly curved and with anal angle rather strongly rounded (decidedly less so than in *Aenasius punctatus* Comp.): radius emitted at an angle approaching 45° , quite strongly curved, with a poorly defined stigma, but tapering to a small uncus that does not extend quite as far as apex of postmarginal (the apex of which is difficult to make out with precision) (Text-fig. 97).

Head blue-green with bronzy reflections, merging to blue on facial area, fore part and hind margin of frontovertex. Thorax above a very dull blue-green. Pleura, propodeum and gaster brownish black, with weak bronzy reflection. Antennae blackish to paler, with weak metallic reflections, the pedicellus narrowly pale at apex. Leg colour as described for *lepellei* Kerrich.

Redescribed from the following. ERITREA: Nefasit, 1 ♀, 16.iv.1930, *ex Planococcus citri* (Risso) on *Olea chrysophylla* (H. Compere), (paratype): 1 ♀, same data but "*ex L. viridis*". Material in British Museum (Natural History).

Neodiscodes abengouroui (Risbec) sp. rev.

(Text-fig. 95)

1951 *Coccophoctonus abengouroui* Risbec, *Mém. Inst. franç. Afr. noire* **13**: 128, 145-6, 149.

1953 *Neodiscodes martinii* Compere; Kerrich, *Bull. ent. Res.* **44** (4): 793-5 *ex parte* (including fig. 9) [Mis-identification].

1955 *Neodiscodes martinii* Compere; Risbec, *Agron. Trop., Nogent* **10** (2): 236.

Head, seen from above (Text-fig. 95), with median length to breadth = 1: 1.7 to 2.2; frontovertex to total breadth = 1: 5.6 to 7.3, with median ocellus about two-thirds its own in diameter from orbital margin: in side view about as in *martinii* Comp., in facial view with cheeks weakly rounded. Frontovertex with reticulate microsculpture fine; with orbital piliferous punctures distinct and sharp, separated by about their own diameters or much less; with larger punctures between ocelli large, in a reticulation that sometimes is loose, those before median ocellus decidedly larger, reticulate (Text-fig. 95). Eyes densely and very strongly hairy, very distinctly so $\times 13$.

Antennal scape about 2.1 times length of its greatest breadth.

Mesoscutum with reticulate microsculpture rather fine, more regular and outstanding than in *martinii* Comp., less regular and more outstanding at sides, beset with piliferous punctures that mostly are separated by less, often much less, than their own diameters in middle but are smaller and much sparser at sides. Axillae and scutellum with microsculpture about as on middle of mesoscutum, and with punctures about equally coarse or less so, usually sparser and separated by more than their own diameters. Scutellum bluntly pointed at apex.

Fore wing twice length of its greatest breadth, with outer margin moderately curved and with anal angle rather sharp: radius emitted at a slightly less acute angle than in *indicus* Naray. & Subba Rao, moderately curved near base but almost straight in more than apical half, with uncus that does not extend quite as far as apex of postmarginal.

Head blue-green to blue, with bronzy reflections more or less strong and extensive, on facial area often tending more to brassy. Thorax above steely green, with bronzy reflection weak to rather strong. Antennae blackish brown, with weak metallic reflections: scape and pedicellus markedly pale at apex, and basal flagellar segments similarly pale. Leg colour as described for *lepellei* Kerrich.

Redescribed from the following. GHANA: Tafo, 1 ♀, xi. 1945, 7 ♀, 1947, 4 ♀, 1949, *ex Planococcoides njalensis* (Laing) on cacao (*A. H. Strickland*). IVORY COAST: Abengourou, 2 ♀, *ex Planococcoides njalensis* (Laing) (*F. Datigny*); Divo, 5 ♀, 21.x. 1951, *ex Planococcoides njalensis* (Laing) (*J. Magnin*).

This species, when reared from *Planococcoides njalensis* (Laing) on cacao in Ghana, was determined as *martinii* Compere. Later Mr. R. G. Donald, on the basis of host data, suspected that *Coccophoctonus abengouroui* Risbec was the same species. This identity was confirmed both by myself, and also by Monsieur Risbec who published the synonymy (1955). When studying the genus more intensively in 1966, I requested the loan of Risbec's type. Dr. R. M. Quentin kindly sent two slides, both labelled as type. One contains two female specimens from Ivory Coast, Abengourou, reared from *Pl. njalensis* (Laing), and I am convinced that these are the same as the species reared from the same host in nearby Ghana. I hereby restrict the selection of lectotype to these two specimens, but refrain from choosing between them since, on the mount, some features can be seen better on one and some on the other. The other slide contains the single specimen from Senegal, Bambey: this is in poor condition and I cannot determine it with confidence as the same species, though I believe it to be so. The specimens recorded from Kenya (Kerrich, 1953) as female and male are two males.

Text-fig. 95 of the present work was drawn from the same specimen as Fig. 9 of Kerrich, 1953, but at a very different angle, in order to correspond with Text-fig. 94 and to illustrate the macrosculpture in both species.

Neodiscodes subbaraoi sp. n.

Head, seen from above, relatively long, with median length to breadth = 1 : 1.7; fronto-vertex to total breadth = about 1 : 6.5, with median ocellus half its own diameter from orbital margin: in side view rather as in *lepellei* Kerrich (cf. Text-fig. 96) but more evenly curved; in facial view with cheeks scarcely rounded. Frontovertex with reticulate microsculpture fine; with orbital piliferous punctures distinct, separated by about their own diameters or less; with larger punctures between ocelli large and mostly not well separated, those before median ocellus very large and in a loose reticulation. Eyes strongly hairy, very distinctly so $\times 25$.

Antenna relatively stout, the scape 2.0 times length of its greatest breadth, the pedicellus less than twice as long as broad, the sixth funicle segment more than $2\frac{1}{2}$ times as broad as long, and the club about as broad as long.

Mesoscutum with reticulate microsculpture fine and regular, decidedly denser but little more outstanding at sides, beset with shallow piliferous punctures that mostly are separated by more than their own diameters in middle, and are very much sparser at sides. Axillae and scutellum with microsculpture a little more outstanding than on middle of mesoscutum, and with piliferous punctation sparse and irregular. Scutellum rounded at apex.

Fore wing twice length of its greatest breadth, with outer margin well curved and with anal angle well rounded: radius emitted at a moderately acute angle, moderately curved, with uncus that does not quite extend as far as apex of postmarginal.

Head deep blue-green, with weak bronzy reflections, the facial area and adjacent part of frontovertex deep blue. Thorax above with fundamental dull blue-green scarcely evident except peripherally, strongly overspread with dull bronzy. Pleura, propodeum and gaster as described for *indicus* Narayanan & Subba Rao. Antennae blackish, with metallic reflections very weak. Legs brownish black, with all femora and tibiae in large part much paler: tarsi stramineous, weakly darkened beneath and at segmental apices.

Holotype ♀. HONG KONG: "ex mealybug" (*S. Flanders*) (given to H. Compere, 17-iii.1954).

Paratypes. HONG KONG: 1 ♀ (same data as holotype). JAVA: Bogor, 1 ♀, 5.v.1937, ex *Planococcus lilacinus* (Ckll.) (*R. H. le Pelley*).

Holotype and the paratype from Java in British Museum (Natural History), paratopotype in Citrus Experiment Station, Riverside.

This species is named for Dr. B. R. Subba Rao in recognition of his contributions to our knowledge of the Chalcidoidea of economic importance in India.

Neodiscodes indicus Narayanan & Subba Rao

(Text-figs. 98, 100)

1960 *Neodiscodes indicus* Narayanan & Subba Rao, *Indian J. Ent.* **22**: 75-77.

Head, seen from above, with median length to breadth = 1 : 1.7 to 2.1; frontovertex to total breadth = 1 : 5.1 to 7.3, with median ocellus its own diameter from orbital margin or rather less: in side view about as in *lepelleyi* Kerrich (Text-fig. 96); in facial view with cheeks moderately rounded below, conspicuously though shallowly emarginate above. Frontovertex with reticulate microsculpture strong; with orbital piliferous punctures very distinct, separated by rather more than their own diameters; with larger punctures between ocelli rather large but mostly well separated, those before median ocellus larger, mostly well separated in hinder half but becoming reticulate above facial area. Eyes rather strongly hairy, distinctly so $\times 25$.

Antennae rather stouter than in most species: antennal scape two and a quarter times length of its greatest breadth, sixth funicle segment about three times as broad as long, and club almost as broad as long.

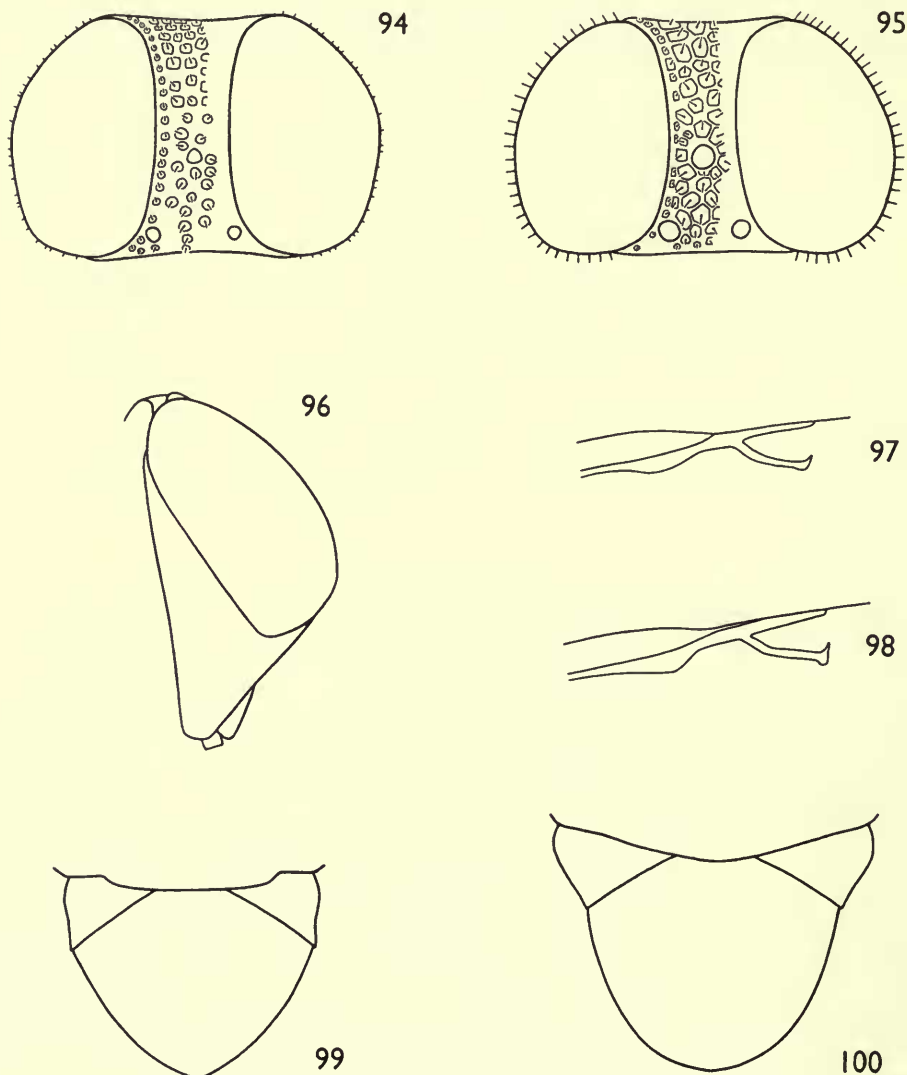
Mesoscutum in middle shining, having reticulate microsculpture very fine, but at sides dull, with the microsculpture coarser and much more outstanding, beset with piliferous punctures that usually are mostly separated by more than their own diameters in middle, but at sides are markedly shallower and much sparser. Axillae and scutellum with microsculpture decidedly more outstanding than on middle of mesoscutum but not much less shining, more sparsely beset with piliferous punctures of very mixed sizes. Scutellum rounded at apex (Text-fig. 100).

Fore wing twice length of its greatest breadth, with outer margin moderately curved and with anal angle relatively sharp: radius emitted at a very acute angle, slightly, sometimes moderately, curved, with a defined stigma, and with a small to moderate uncus that extends as far as apex of postmarginal (Text-fig. 98).

Head blue-green, often paler on frontovertex and deeper on facial area; with reflections brassy to red-coppery, on frontovertex usually extensive, on facial area usually confined to lower part of inter-scorbal prominence but sometimes more extensive. Pronotum and mesoscutum dull blue-green, axillae and scutellum steely-green, all with considerable bright bronzy reflection. Pleura, propodeum and gaster brownish black to blackish brown, with weak bronzy reflection, the pleura and the propodeum at sides dull, with very weak reflection. Antennae having scape and pedicellus blackish with weak reflections, the scape sometimes markedly paler near apex; having flagellum normally with two to five basal segments dull stramineous to pale testaceous, at least below, merging to the blackish brown funicle apex and club. Leg colour much as described for *lepelleyi* Kerrich but the amount of darkening very variable.

Redescribed from the following material. INDIA: New Delhi, 1 ♀, 4-x.1957, ex "citrus scale" (*G. W. Angalet*); Puri, 1 ♀, 9.iv.1960, ex mealybug on *Casuarina*; Gwalior, Madhya Prad., 4 ♀, 9.ix.1959, ex grape-fruit mealybug (*S. U. Kittur*); Gwalior, 5 ♀, ex grape-fruit mealybug, per B. R. Subba Rao. W. PAKISTAN, nr.

Rawalpindi, Wah, 4 ♀, 11.viii.1961, ex mealybug on *Morus alba*, per *Comm. Inst. Biol. Control*. Material in British Museum (Natural History) and in U.S. National Museum.



FIGS. 94-100. *Neodiscodes* species, females. 94-95. Head, seen from above, of 94, *N. comperei* sp. n. and 95, *N. abengouroui* (Risb.). 96. Head, in dextro-lateral view, of *N. lepelleyi* Kerrich. 97-98. Part of right fore-wing, of 97, *N. martinii* Comp. and 98, *N. indicus* Naray. & Subba Rao. 99-100. Scutellum and axillae of 99, *N. martinii* Comp. and 100, *N. indicus* Naray. & Subba Rao.

KEY TO SPECIES OF *NEODISCOIDES* COMPERE : FEMALES

- 1 Smaller species of length scarcely 1 mm.: frontovertex at narrowest two-ninths the total head breadth: uncus not nearly reaching apex of postmarginal: [median ocellus about $1\frac{1}{2}$ times its own diameter from orbital margin: radius emitted at about 45°]: Hong Kong *parvus* sp. n.
Larger species, length $1\frac{1}{2}$ to 2 mm.: frontovertex less than a fifth the total head breadth: uncus reaching very nearly to apex of postmarginal or even slightly beyond: [the other two characters not combined, the radius emitted at a much acuter angle except in *martinii* Comp. (Text-fig. 97)] 2
- 2 Fore wing $2\frac{1}{2}$ times length of its greatest breadth, with outer margin almost straight: median ocellus about $1\frac{1}{2}$ times its own diameter from orbital margin: head, seen from above (Text-fig. 94), in side view relatively long, especially below, and sharply curved: frontovertex with green coloration mainly overspread with dull bronzy: Africa *comperei* sp. n.
Fore wing twice length of its greatest breadth, with outer margin moderately curved: median ocellus about its own diameter from orbital margin or less: head in side view relatively shorter, less sharply curved: frontovertex normally with green coloration conspicuous 3
- 3 Eyes weakly and rather sparsely hairy ($\times 45$): inter-ocellar area having punctures of only moderate strength with wide interspaces (as in *comperei* sp. n., Text-fig. 94): antennal scape 2.6 times length of its greatest breadth: [median ocellus half its own diameter from orbital margin]: Ceylon and India *lepelleyi* Kerrich
Eyes moderately to strongly hairy: inter-ocellar area with stronger punctures in a reticulation or almost so (e.g. Text-fig. 95): antennal scape $2\frac{1}{2}$ times length of its greatest breadth or less 4
- 4 African species: head in side view longer than in alternate: antennae of normal build for the genus: scutellum somewhat pointed at apex (e.g. Text-fig. 99) 5
Asiatic species: head in side view of length about as in *lepelleyi* Kerrich (Text-fig. 96): antennae relatively stouter: scutellum rounded at apex (Text-fig. 100): [eyes not so very strongly and densely hairy as in *abengouroui* (Risb.) 6
- 5 Median ocellus about its own diameter from orbital margin: eyes moderately strongly hairy, the hairs discernible with difficulty $\times 25$: microsculpture on axillae and scutellum much coarser than on middle of mesoscutum: scutellum relatively sharply pointed at apex (Text-fig. 99): radius emitted at an angle approaching 45° , moderately curved (Text-fig. 97) *martinii* Compere
Median ocellus about two-thirds its diameter from orbital margin: eyes densely and very strongly hairy, very distinctly so $\times 13$ (Text-fig. 95): microsculpture on axillae and scutellum about as on middle of mesoscutum: scutellum more bluntly pointed at apex: radius emitted at a much acuter angle and less curved *abengouroui* (Risbec)
- 6 Median ocellus half its own diameter from orbital margin: frontovertex with reticulate microsculpture fine: mesoscutum with reticulate microsculpture little more outstanding at sides than in middle: antennae without paler colouring: Hong Kong, Java *subbaraoi* sp. n.
Median ocellus its own diameter from orbital margin or rather less: frontovertex with reticulate microsculpture strong: mesoscutum with reticulate microsculpture much more outstanding at sides than in middle: antennae having flagellum normally with two to five basal segments pale, at least below: India and W. Pakistan *indicus* Narayanan & Subba Rao

EURYRHOPALUS Howard, 1898

Only two species have previously been ascribed correctly to this genus.

Euryrhopalus pretiosus (Timberlake)

(Text-fig. 113)

1924 *Synaspidia pretiosa* Timberlake, *Proc. Hawaii ent. Soc.* 5 (3) : 397-402.1942 *Euryrhopalus pretiosus* (Timberlake) Gahan, *Proc. U.S. natn. Mus.* 92 : 49.

Head, seen from above, less than twice as broad as median length : frontovertex one-sixth the total head breadth, with median ocellus two-thirds its own diameter from orbital margin (similar to Text-fig. 101) : in side and facial views as described for *kirkpatricki* (Kerrich). Frontovertex with reticulate microsculpture fine behind median ocellus, very fine before it ; with orbital piliferous punctures very fine ; with larger punctures between ocelli of less than moderate strength, separated by less than their own diameters, those before median ocellus of moderate strength, situated in two rows diverging with the orbits. Piliferous punctures in malar area rather fine. Eyes rather sparsely hairy, discernibly so $\times 25$.

Mandibles tridentate, the middle tooth the longest.

Antenna with scape four times length of its greatest breadth ; with pedicellus twice as long as its greatest breadth ; with funicle segments short cup-shaped to short cylindrical, the club one-sixth longer than the combined funicle segments and two-thirds as broad as long.⁴

Mesoscutum and axillae shining, with reticulate microsculpture very fine, beset with piliferous punctures that are rather fine and of moderate depth, separated by about or more than their own diameters : scutellum similar, but with piliferous punctures finer, often very much finer, and relatively more separated. Scutellum very obtuse at apex (Text-fig. 113), margined by a sharp ridge or fold. Propodeum with spiracles sub-circular, larger than in other species of this genus (Text-fig. 113).

Fore wings, except on speculum, uniformly weakly infusate, markedly broader, relatively, than in *kirkpatricki* (Kerrich), their length (from apex of tegula) under twice their greatest breadth, with outer margin and anal angle moderately rounded : postmarginal three and two-thirds times length of marginal, and radial, which has a long, pointed uncus, two and two-thirds times.

Head blue-green to blue, the frontovertex often with some red-violet and bronzy reflection, the mouth region and hinder genae dull bronzy. Dorsum of thorax with fundamental blue-green overspread with metallic reflection which on scutellum and axillae is bright bronzy, on meso-scutum weaker and sometimes more violaceous. Coloration of pleura, propodeum and gaster as described for *kirkpatricki* (Kerrich). Antennal coloration as described for *kirkpatricki* (Kerrich), but weaker. Legs blackish brown with metallic reflections, the tarsi pale brown to whitish, somewhat darkened, the mid femora at apex and mid tibiae at base translucent.

Redescribed from the following. MEXICO: Vera Cruz, 5 ♀, 1922-23 (holotype and paratypes), ex mealybug on *Tillandsia* and ex *Dysmicoccus brevipes* (Ckll.) on Bromeliaceous plants (*H. J. Osborn*). GUATEMALA: San Sebastian, 1 ♀, v. 1934, per *W. Carter*; Guatemala, unlocalized, 1 ♀, 26.1.1937, ex *Dysmicoccus brevipes* (Ckll.), (*E. G. Salas*) (shipped to Hawaii).

Holotype in Bishop Museum, Honolulu: material in collections of Hawaiian Sugar Planters' Association and of State Department of Agriculture, Honolulu, in Citrus Experiment Station, Riverside, in U.S. National Museum and in British Museum (Natural History).

⁴ In the figure of Timberlake (1924), the pedicellus and flagellum are represented as one would wish them to be but, in the specimen illustrated, the scape was evidently foreshortened either by lateral curvature or by coming to rest in a different plane when the slide mount was made.

Euryrhopalus schwarzi Howard

(Text-fig. 102)

1898 *Euryrhopalus schwarzi* Howard, *Proc. U.S. natn. Mus.* **21** : 237.1942 *Euryrhopalus schwarzi* Howard ; Gahan, *Ibidem*, **92** : 49.

The unique type of this species is located in the U.S. National Museum. The head was fragmented on a slide by A. A. Girault. Dr. B. D. Burks, referring to specimens of *pretiosus* (Timb.) and *kirkpatricki* (Kerrich), my manuscript description of those species and copies of certain figures, very kindly sent me a description of the type of *schwarzi* and answered supplementary questions. Girault's slide of the head was made available to me on loan. From this slide I was not able to describe the sculpture or colour, but I was able to draw two fragments separately and piece the two drawings together, thus producing Text-fig. 102, and also to measure the antennal segments. The following description is compounded from these sources.

Head with frontovertex very narrow, the median ocellus a quarter its diameter from orbital margin (Text-fig. 102).

Antenna with scape nearly five times length of its greatest breadth; with pedicellus more than twice length of its greatest breadth; with funicle segments short cup-shaped to short cylindrical, the sixth 2.3 times as long as broad, the club slightly longer than the combined funicle segments and three-quarters as broad as long.

"Mesoscutum and axillae subshining, with surface almost smooth, only very indistinct surface sculpture present: piliferous punctures extremely shallow, separated by more than their own diameters. Scutellum slightly less shining, with faint reticulate microsculpture: piliferous punctures as on mesoscutum." Scutellum very obtuse at apex (cf. Text-fig. 113), margined by a sharp ridge or fold. Propodeum with spiracles very large (cf. Text-fig. 113), and with white hair lateral to them "very dense and long".

"Fore wing twice as long as broad (75 : 38), with outer and anal margins rounded much as in *kirkpatricki*: postmarginal $3\frac{1}{2}$ times length of marginal, and radial $2\frac{1}{2}$ times length of marginal: apex of radial vein vaguely defined, with a faint uncus present."

"Thorax and abdomen uniformly black: fore and hind legs, except for tarsi, black: mid legs, except for tarsi, dark brown," the femur at apex and tibia at base not noticeably paler: "all tarsi white, apical segment of each slightly darkened. Fore wing with a prominent dark brown shadow enveloping apex of submarginal vein, marginal, postmarginal and radial veins, and extending across wing to its middle".

Redescribed from the following: U.S.A.: Florida, Biscayne (Bay), 1 ♀, 16.v. (holotype). Holotype in U.S. National Museum (cat. no. 5029).

Euryrhopalus saccharicola (Gahan) comb. n.

(Text-fig. III)

1942 *Blepyrus saccharicola* Gahan, *Proc. U.S. natn. Mus.* **92** : 47-49.

Head from above moderately broad, median length to breadth = 1 : 2.1 to 2.3; frontovertex about one-seventh the total head breadth (more in small specimens), with median ocellus more than half its diameter from orbital margins: in side view relatively distinctly shorter than in *kirkpatricki* (Kerrich), rather evenly curved; in facial view with cheeks relatively short and evenly rounded. Frontovertex with reticulate microsculpture regular and of moderate strength

behind median ocellus, rather fine before it ; with orbital piliferous punctures very fine ; with larger punctures between ocelli of moderate strength and before median ocellus obviously finer, in both positions not scattered or in rows, but separated by much less than their own diameters. Piliferous punctures in malar area rather fine. Eyes rather closely hairy, discernibly so $\times 45$.

Mandibles tridentate, the middle tooth the longest.

Antenna with scape slightly expanded below, five times length of its greatest breadth ; with pedicellus twice length of its greatest breadth ; with funicle segments short cup-shaped to short-cylindrical, the sixth $1\frac{1}{2}$ times as broad as long, and club one-quarter longer than combined funicle segments and 1.7 times as long as broad.

Mesoscutum with reticulate microsculpture fine, beset with fine but dense piliferous punctures, which are separated by about or less than their own diameters. Scutellum with reticulate microsculpture still finer but much more outstanding, giving the sclerite a velvety appearance : pilosity less dense than on mesoscutum. Axillae intermediate in sculpture between mesoscutum and scutellum.

Fore wings relatively elongate, about 2.3 times as long as broad, with outer margin and anal angle well rounded : marginal vein relatively long, just over half length of postmarginal, and almost as long as the radial, which has a large uncus (Text-fig. 111) : hair rows on costal cell relatively dense.

Head blue-green to dull blue, almost entirely overspread with dull violet to bronzy. Pronotum, mesoscutum, tegulae, axillae and scutellum with fundamental blue-green to blue showing, often rather weakly, through the bronzy to red-violet reflection. Pleura, propodeum and gaster brownish black, with weak but bright blue-green and bronzy reflection. Antennal scape yellow, slightly darkened at apex : pedicellus and flagellum blackish brown with weak green reflections, the pedicellus pale at apex and beneath. Legs having coxae, femora and fore trochanters blackish brown, with weak metallic reflections, the femora at apex and the mid and hind trochanters paler : tibiae and tarsi yellowish white, the tibiae a little darkened near base.

Redescribed from the following. U.S.A.: California, Fontana, 4 ♀, 1953, reared on *Phenacoccus solani* Ferr., *Commonwealth Institute of Biological Control*. Material in British Museum (Natural History).

Euryrhopalus pulchrior sp. n.

(Text-figs. 104, 112)

Head, seen from above, with median length to breadth = $1:1.8$; frontovertex nearly one-seventh the total head breadth, with median ocellus two-thirds its own diameter from orbital margin : in side view hardly shorter than in *kirkpatricki* (Kerrich) and almost evenly rounded ; in facial view with cheeks well rounded, very much shorter : toruli slightly less than their own length from eye (Text-fig. 104). Frontovertex with reticulate microsculpture fine but rather outstanding ; with orbital piliferous punctures relatively strong, separated by about or rather more than their own diameters ; with larger punctures between ocelli of moderate strength, separated by less than their own diameters ; with punctuation for some distance before median ocellus shallower and smaller, but then again becoming larger and attaining an almost reticulate condition above scrobal impression. Piliferous punctures on malar area fine. Eyes coarsely and closely hairy.

Mandibles tridentate, the middle tooth the longest.

Antenna with scape slightly expanded beneath, about five times length of its greatest breadth ; with pedicellus twice length of its greatest breadth ; with first five funicle segments short cup-shaped, the sixth $2\frac{1}{2}$ times as broad as long and club strongly expanded, three-quarters longer than the combined funicle segments and twice as long as broad.

Mesoscutum and axillae with reticulate microsculpture strong and sharp, beset with moderate piliferous punctures that mostly are separated by rather more than their own diameters. Scutellum with microsculpture similar, but becoming gradually a little finer towards apex, and with punctures much shallower, finer and sparser.

Fore wings up to and below radius rather strongly infusate, weakly so above it, and beyond rather broad, about 2.1 times as long as broad, with outer margin and anal angle well rounded : postmarginal vein 2.0 times and radial, which has a sharp uncus, 1.8 times length of marginal ; thus, the marginal is relatively long, the postmarginal is relatively short and does not extend far beyond the radial (Text-fig. 112).

Head bright green, around and before the median ocellus with bright brassy reflections, behind median ocellus and on hinder genae more blue-green. Pronotum bright blue-green above. Mesoscutum, axillae, scutellum, sides of propodeum and gaster a rather duller green than the head, and overspread with duller brassy to bronzy reflections : mesopleura and propodeum above steely black with weak reflections. Antennae yellow-testaceous : scape in about basal half, pedicellus except at apex and beneath, and club infusate with moderate metallic reflections, the basal funicle segments slightly darkened above. Coxae a similar green to the sides of propodeum : legs otherwise yellow-testaceous, the fore and hind femora in about basal half, and the trochanters infusate with metallic reflections, and the fore tibiae and mid femora with slight darkening.

Holotype ♀. JAMAICA: Hope Gardens, v.1964, on *Acalypha* (F. D. Bennett). Holotype in British Museum (Natural History).

This species is not a typical *Euryrhopalus* in appearance but is more suggestive of an *Aenasius*.

Euryrhopalus tenuiscapus sp. n.

(Text-fig. 106)

Head, seen from above, moderately broad, median length to breadth = 1 : 2.1 ; frontovertex one-sixth the total head breadth, with median ocellus nearly its own diameter from eye : in side view relatively distinctly shorter than in *kirkpatricki* (Kerrich), quite strongly curved above but weakly so below ; in frontal view with cheeks moderately curved and evenly narrowed to mouth : toruli much more than their own length from eye. Frontovertex with reticulate microsculpture rather strong behind median ocellus, of moderate strength before it ; with orbital piliferous punctures relatively close together and only moderately fine ; with larger punctures between ocelli of less than moderate strength and irregular, some separated by about their own diameters and others almost contiguous, those before median ocellus of similar strength, situated in two rows diverging with the orbits but also with others between. Piliferous punctures on malar area fine. Eyes closely hairy, distinctly so $\times 45$.

Mandibles tridentate, the middle tooth the longest, the uppermost small and well set back.

Antenna (Text-fig. 106) with scape weakly expanded below, slender, $6\frac{1}{2}$ times length of its greatest breadth ; with pedicellus $2\frac{1}{2}$ times length of its greatest breadth ; with funicle segments short cup-shaped, the sixth twice as broad as long, and club very strongly expanded, over a quarter longer than combined funicle segments and twice as long as broad.

Mesoscutum and axillae with reticulate microsculpture fine, beset with piliferous punctures that are very shallow and rather fine, and are mostly separated by more than their own diameters. Scutellum with microsculpture much more regular and outstanding, and beset with fine piliferous punctures that are about as dense as on mesoscutum.

Fore wing shape as described for *kirkpatricki* (Kerrich) : postmarginal five times length of marginal, and radial, which has a small uncus, three times.

Head blue-green to blue, almost entirely overspread with dull violet to bronzy. Colour of thorax, propodeum and gaster as described for *saccharicola* (Gah.). Antennae blackish brown,

with weak metallic reflections, the scape and pedicellus paler at apex. Legs brownish black to blackish brown, with weak metallic reflection: tarsi, and mid and hind tibiae narrowly at apex, pale brown to whitish.

Holotype ♀. U.S.A.: California, Fillmore, 7.x.1936, ex *Phenacoccus* sp. (*J. D. Maple*). Holotype in U.S. National Museum.

***Euryrhopalus rhopideus* sp. n.**

(Text-figs. 105, 107, 109, 114)

Head, seen from above, a little less than twice as broad as its median length; frontovertex one-seventh the total head breadth, with median ocellus two-thirds its diameter from orbital margin: in side view relatively much shorter than in *kirkpatricki* (Kerrich), but rather evenly curved (Text-fig. 109); in frontal view with cheeks rather long and evenly curved: toruli nearly twice their own length from eye (Text-fig. 105). Sculpture of frontovertex as described for *pretiosus* (Timb.), but the punctures before median ocellus of less than moderate strength. Piliferous punctures on malar area fine. Eyes closely hairy, just distinctly so $\times 25$.

Mandibles tridentate, the uppermost tooth small and well set back, the lower two very sharp, the middle one the longer (Text-fig. 105).

Antenna (Text-fig. 107) with scape slightly expanded beneath, more than five times length of its greatest breadth; with pedicellus twice length of its greatest breadth; with flagellum relatively only moderately clavate, the club not abruptly broader than the funicle: with first five funicle segments very short cup-shaped, the sixth twice as broad as long, and club one-third longer than the combined funicle segments and twice as long as broad.

Dorsum of thorax as described for *tenuiscapus* sp. n.: see also Text-fig. 114.

Fore wing shape as described for *saccharicola* (Gah.), but broader than in that species, about two and a quarter times as long as broad: postmarginal four times length of marginal, and radial, which has a moderate uncus, two and a third times.

Head blue-green to blue, almost entirely overspread with dull violet to bronzy. Colour of thorax, propodeum and gaster as described for *saccharicola* (Gah.). Antennae a rather pale brownish black, with weak, predominantly green, metallic reflections: scape, pedicellus, and club beneath, paler at apex. Legs brownish black, the fore tibiae at extreme base and apex and the mid tibiae a rich brown; tarsi pale brown to whitish.

Holotype ♀. U.S.A.: Texas, Denison, 15.vi.1938, on peach (*Christenson & Clancy*). Holotype in U.S. National Museum.

***Euryrhopalus carolinensis* sp. n.**

(Text-fig. 101)

Head, seen from above, twice as broad as its median length: frontovertex one-seventh the total breadth, with ocelli relatively large, the median ocellus just under half its diameter from orbital margins (Text-fig. 101): in side view relatively distinctly shorter than in *kirkpatricki* (Kerrich), quite strongly curved above but weakly so below; in frontal view with cheeks longer than in *kirkpatricki* (Kerrich), weakly narrowed to where they turn sharply in to mouth region. Frontovertex sculpture as described for *pretiosus* (Timb.). Piliferous punctures in malar area rather fine. Eyes closely hairy, quite distinctly so $\times 25$.

Mandibles rather stout, tridentate, the middle tooth the longest, the uppermost small and well set back.

Antenna with scape more than slightly expanded, four times length of its greatest breadth; with pedicellus relatively elongate, three times length of its greatest breadth; with funicle segments short cup-shaped to short-cylindrical, the sixth nearly twice as broad as long, and club one-half longer than combined funicle segments and nearly two-thirds as broad as long.

Mesoscutum and axillae with reticulate microsculpture fine, beset with piliferous punctures that are of moderate depth and mostly are separated by less than their own diameters. Scutellum with microsculpture more regular and outstanding, and beset with fine piliferous punctures that are about as dense as on mesoscutum. Propodeum weakly hairy behind spiracle.

Fore wing shape as described for *kirkpatricki* (Kerrich), about two and a quarter times as long as broad : postmarginal five times length of marginal, and radial, which has a moderate uncus, about two and a half times length of marginal.

Head dull blue-green, almost steely green, overspread on frontovertex weakly and on lower face and genae strongly with blackish violet. Colour of dorsum of thorax as described for *saccharicola* (Gah.). Pleura, propodeum and gaster brownish black, with weak metallic reflection. Antennae brownish black, with blue-green to bronzy reflections which are strongest on scape and pedicellus. Legs brownish black with metallic reflections, the tibiae and fore femora only narrowly paler at apex : tarsi stramineous with infusions of pale brown, the fore and hind tarsi above and all at apex slightly darkened.

Holotype ♀. U.S.A.: N. Carolina, L. Junaluska, 24.v.1954 (*H. V. Weems*). Holotype in U.S. National Museum.

***Euryrhopalus kirkpatricki* (Kerrich), comb. n.**

(Text-figs. 103, 108, 110)

1953 *Neodiscodes kirkpatricki* Kerrich, *Bull. ent. Res.* **44** (4) : 793-5.

1954⁵ *Neodiscodes kirkpatricki* Kerrich ; Kirkpatrick, *Rep. Cacao Res.* (1952) : 68. Imperial College of Tropical Agriculture, Trinidad.

Head, seen from above, about twice as broad as its median length : frontovertex exceptionally narrow, at narrowest less than a tenth the total head breadth, with median ocellus about a quarter its diameter from orbital margin (Text-fig. 103) : in side view (Text-fig. 110) relatively long and evenly curved ; in facial view with cheeks relatively short and evenly rounded. Frontovertex with reticulate microsculpture regular and of moderate strength behind median ocellus, very fine before it ; with orbital piliferous punctures very fine but regular ; with larger punctures between ocelli of moderate strength, mostly separated by less than their own diameters, and before median ocellus obviously finer and more scattered. Piliferous punctures in malar area moderate. Eyes moderately closely hairy, just distinctly so $\times 45$.

Mandibles tridentate, the middle tooth much the longest.

Antenna (Text-fig. 108) with scape slightly expanded below, about $4\frac{1}{2}$ times length of its greatest breadth ; with pedicellus almost twice length of its greatest breadth ; with funicle segments short cup-shaped to short-cylindrical, the sixth at longest over twice as broad as long, and club about one-half longer than combined funicle segments and two-thirds as broad as long.

Mesoscutum and axillae shining, with microsculpture extremely fine, beset with rather shallow piliferous punctures that mostly are separated by about or less than their own diameters. Scutellum much less shining, with reticulate microsculpture moderately coarse, regular and outstanding ; with piliferous punctures sharper than on mesoscutum, in greater part rather dense but posteriorly separated by much more than their own diameters. Scutellum margined at apex by a sharp ridge or fold. Propodeum coarsely and densely white-hairy round spiracle.

Fore wings relatively considerably broader than in *saccharicola* (Gah.), but well over twice as long as broad, with outer margin rather weakly and anal angle only moderately rounded : postmarginal $3\frac{1}{2}$ times length of marginal, and radial, which has a small uncus, $2\frac{1}{2}$ times length of marginal.

⁵ This part was published bearing the date November 1953, which was actually the date on which the material was sent from the London office of the College to the printer. The late Dr. W. J. Hall was definite that the publication was not available earlier than 11th January, 1954. Kirkpatrick attributed this and other species to Kerrich and not to himself : his brief but possibly valid descriptions were not intended to, and did not in fact antedate the descriptions of Kerrich published on 15th December, 1953.

Head blue-green to blue, often with much red-violet on frontovertex ; the shining facial area blue-green with brassy reflection, the mouth region and sometimes hinder genae or ocellar area dull bronzy. Pronotum, mesoscutum, tegulae, axillae and scutellum fundamentally blue-green, the mesoscutum, except peripherally, with conspicuous red-violet reflection, the remaining parts, notably the scutellum generally, strongly bronzy. Pleura, propodeum and gaster brownish black with metallic reflections predominantly blue-green and bronzy, the blue-green most conspicuous at sides of propodeum, the gaster paler beneath. Antennae blackish brown, with rather weak green metallic reflections, which are strongest on scape and pedicellus ; the two latter segments narrowly pale at apex. Legs brownish black, with weak metallic reflections, merging to pale brown : tarsi pale brown to whitish, very little darkened at apex.

Redescribed from the following material. COLOMBIA: nr. Palmira, 3 ♀, i. 1953, "ex Coccid" (*D. J. Taylor*). TRINIDAD: I.C.T.A., 14 ♀ (including holotype) 1950 ex *Dysmicoccus* sp. near *brevipes* (Ckll.) on cacao (*T. W. Kirkpatrick*). PANAMA: Canal Zone, Paraiso, 1 ♀, i. 1911 (*E. A. Schwarz*). Material in U.S. National Museum, Citrus Experiment Station, Riverside, Bishop Museum, Honolulu, and British Museum (Natural History).

Euryrhopalus propinquus sp. n.

Very closely related to *kirkpatricki* (Kerrich), differing as follows : head, seen from above, relatively long, 1.5 to 1.7 times as broad as its median length ; frontovertex between an eighth and a tenth the total head breadth, with median ocellus over a quarter its diameter from orbital margin (more obviously separated therefrom than in *kirkpatricki*) : in facial view with eyes diverging less strongly. Frontovertex with microsculpture behind median ocellus fine, with larger punctures between ocelli of more than moderate strength and sometimes almost contiguous, those before median ocellus rather irregularly placed though tending to be in two diverging rows. Eyes weakly and sparsely hairy.

Antenna with scape somewhat broader, $3\frac{1}{2}$ to 4 times length of its greatest breadth.

Mesoscutum and axillae with small piliferous punctures that are clearly separated by more than their own diameters : scutellum with piliferous punctures shallow, rather inconspicuous and relatively sparse.

Fore wings relatively elongate, about 2.3 times as long as broad, with outer margin weakly and anal angle rather well rounded ; postmarginal four times length of marginal, and radial, which has a large uncus, $2\frac{1}{2}$ times length of marginal.

Head a rather bright blue-green ; pronotum and mesoscutum conspicuously dark blue-green except peripherally : pleura, propodeum and gaster paler than in *kirkpatricki*.

Holotype ♀. HAWAIIAN IS.: Oahu, 25. viii. 1941, ex *Dysmicoccus brevipes* (Ckll.) on *Carissa* sp. (*D. T. Fullaway*).

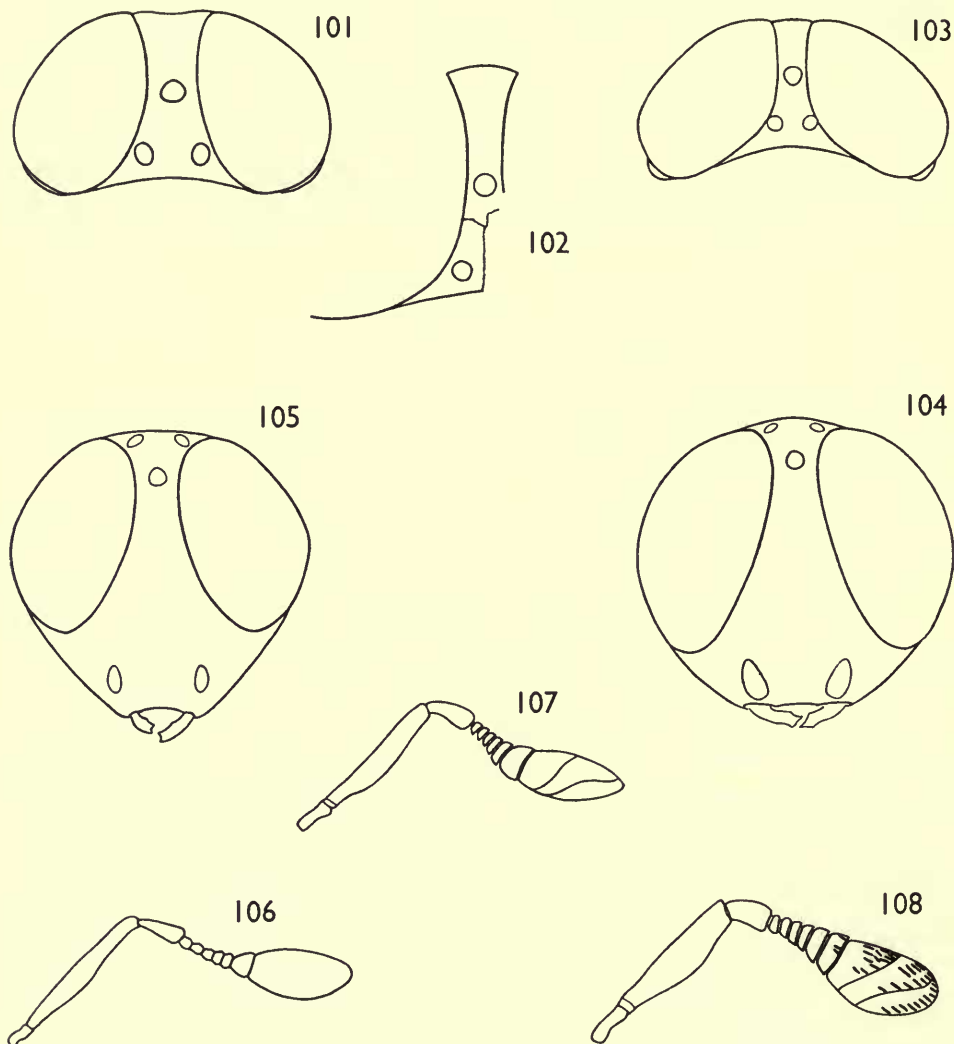
Paratypes the following. BRAZIL: 27° 11' S., 52° 23' W., 1 ♀, 1937 (*F. Plaumann*). BRITISH GUIANA: 1 ♀, 23. xi. 1936, "parasitic on *P. brevipes*" (*E. G. Salas*) (shipped to Hawaii). HAWAIIAN IS.: Oahu, 1 ♀ (same data as holotype); 1 ♀, 10. iii. 1956, ex *Dysmicoccus brevipes* (Ckll.) on sugarcane (*J. W. Beardsley*); Barber's Point, 1 ♀, iv. 1959, ex *Dysmicoccus neobrevipes* Beardsley on "cat's claw" (*J. W. Beardsley*); Lanikai, 3 ♀, x. 1965, ex *Dysmicoccus neobrevipes* Beardsley on sea grape (*C. J. Davis*).

Holotype in Bishop Museum, Honolulu: paratypes in collection of Hawaiian Sugar Planters' Association, in Hawaii Agricultural Experiment Station, in U.S. National Museum and in British Museum (Natural History).

KEY TO SPECIES OF *EURYRHOPALUS* HOWARD: FEMALES

- 1 Scutellum shining, very obtuse at apex, where it is margined by a sharp ridge or fold: propodeum with spiracles especially large (Text-fig. 113) 2
- Scutellum not shining, much less obtuse at apex, and not margined there in all species; propodeum with spiracles smaller (e.g. Text-fig. 114) 3
- 2 Head with frontoververtex less narrow, the median ocellus two-thirds its own diameter from orbital margin (similar to Text-fig. 101): antennal scape four times length of its greatest breadth: pilosity around propodeal spiracle of moderate length and density: fore wings, except on speculum, uniformly weakly infusate; propodeum conspicuously blue-green on sides: mid femora at apex and mid tibiae at base translucent *pretiosus* (Timberlake)
- Head with frontoververtex very narrow, the median ocellus a quarter its own diameter from orbital margin (Text-fig. 102): antennal scape nearly five times length of its greatest breadth: pilosity beside propodeal spiracle very dense and long: fore wings with prominent dark brown infuscation enveloping apex of submarginal, the marginal, postmarginal and radial veins and extending across to middle of wing: no blue-green colour on the propodeum: mid femora at apex and mid tibiae at base not noticeably paler *schwarzi* Howard
- 3 Marginal vein relatively long, the postmarginal not quite twice the length of the marginal (Text-fig. 111): scutellum of velvety appearance, due to the reticulate microsculpture being very fine and outstanding *saccharicola* (Gahan)
- Marginal vein relatively shorter, the postmarginal at least three times length of marginal: scutellum not presenting a velvety appearance, the microsculpture being only moderately fine and outstanding 4
- 4 Median ocellus more than half its diameter from orbital margin (Text-figs. 104-5): antennal scape only slightly expanded beneath, about five times length of its greatest breadth or more 5
- Median ocellus half its diameter from orbital margin or less: antennal scape more distinctly expanded below, about four and a half times length of its greatest breadth or less 7
- 5 Head, in facial view, with cheeks short and toruli slightly less than their own length from eye (Text-fig. 104): punctuation before median ocellus of moderate strength, and attaining an almost reticulate condition above scrobal impression: eyes coarsely hairy: microsculpture on scutellum similar to that on mesoscutum, the punctuation moderately coarse and dense on mesoscutum but much finer and sparser on scutellum: postmarginal vein only a little longer than radial: head bright green, and dorsum of thorax very conspicuously green: hind tibiae yellow-testaceous: Jamaica *pulchrior* sp. n.
- Head, in facial view, much longer, and toruli much more than their own length from eye (e.g. Text-fig. 105): punctuation before median ocellus of less than moderate strength, the punctures mostly in longitudinal rows and well-separated: eyes not coarsely hairy: microsculpture much more outstanding on scutellum than on mesoscutum, the punctuation rather fine and about equally dense on both: postmarginal vein much longer than radial: head and dorsum of thorax mainly over-spread with dull colouring: hind tibiae in greater part darkened 6
- 6 Antennal scape exceptionally slender, six and a half times length of its greatest breadth, and club abruptly broader than funicle (Text-fig. 106): larger punctures before median ocellus arranged in two rows diverging with the orbits but with other punctures between: mid tibiae blackish brown, rather narrowly paler at apex: California *tenuiscapus* sp. n.
- Antennal scape rather over five times length of its greatest breadth, and club not abruptly broader than funicle (Text-fig. 107): frontoververtex between those diverging rows impunctate or almost so: mid tibiae mainly a rich brown, very little darkened: Texas *rhopoideus* sp. n.

- 7 Frontovortex wider, one-seventh the total head breadth: ocelli relatively large (Text-fig. 101): eyes closely and strongly hairy, very distinctly so $\times 25$: head in side view considerably shorter, weakly curved below: pedicellus three times length of its greatest breadth: microsculpture of mesoscutum moderately fine: scutellum not margined at apex: propodeum weakly hairy behind spiracle: N. Carolina
carolinensis sp. n.

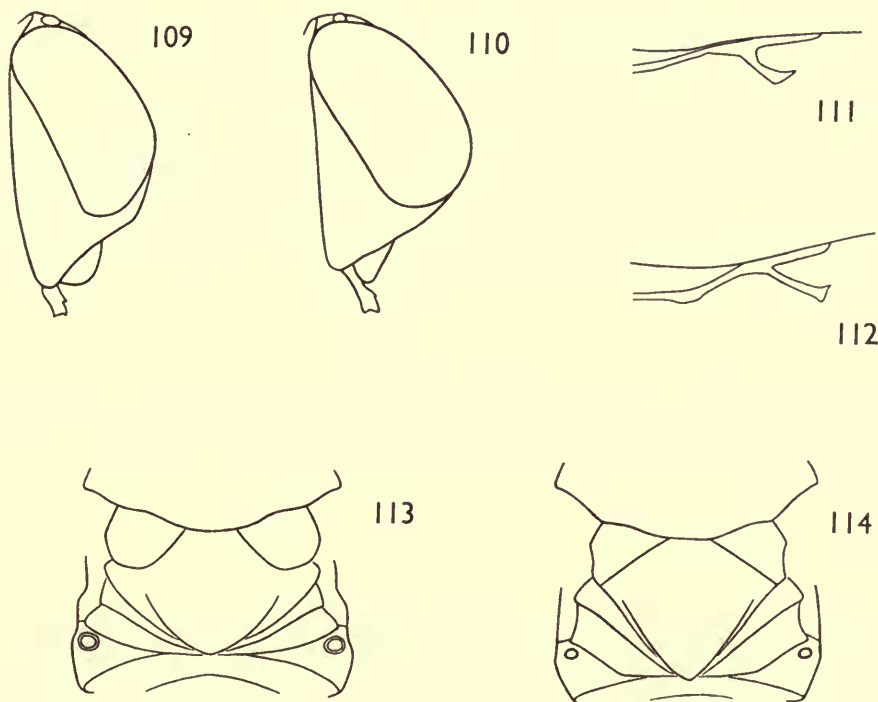


FIGS. 101-108. *Euryrhopalus* species, females. 101-103. Head, seen from above, of 101, *E. carolinensis* sp. n., 102, *E. schwarzi* How. (fragmented) and 103, *E. kirkpatricki* (Kerrich). 104-105. Head, in facial view, of 104, *E. pulchrior* sp. n. and 105, *E. rhopoides* sp. n. 106-108. Left antenna, in dextro-lateral view, of 106, *E. tenuiscapus* sp. n., 107, *E. rhopoides* sp. n. and 108, *E. kirkpatricki* (Kerrich).

Frontovortex narrow, one-eighth to one-tenth the total head breadth or less: ocelli relatively smaller: eyes weakly and sparsely hairy, just discernibly so $\times 45$: head in side view longer, strongly curved below (Text-fig. 110): pedicellus under twice length of its greatest breadth (Text-fig. 108): microsculpture of mesoscutum extremely fine: scutellum at apex margined by a sharp fold: propodeum coarsely and densely white-hairy round spiracle 8

- 8 Head, seen from above, about twice as broad as its median length: frontovortex less than a tenth the total head breadth, with median ocellus about a quarter its diameter from orbital margin (Text-fig. 103): reticulate microsculpture behind median ocellus of moderate strength: mesoscutum and axillae with moderate piliferous punctures separated by about or less than their own diameters: scutellum with piliferous punctures moderately fine and dense *kirkpatricki* (Kerrich)

Head, seen from above, relatively long, 1.5 to 1.7 times as broad as its median length: frontovortex one-eighth to one-tenth the total head breadth, with median ocellus over a quarter its diameter from orbital margin (and more obviously separated therefrom than in alternate): reticulate microsculpture behind median ocellus finer: mesoscutum and axillae with small piliferous punctures clearly separated by more than their own diameters: scutellum with piliferous punctures relatively small, shallow and sparse *propinquus* sp. n.



FIGS. 109-114. *Euryrhopalus* species, females. 109-110. Head, in dextro-lateral view, of 109, *E. rhopoideus* sp. n. and 110, *E. kirkpatricki* (Kerrich). 111-112. Part of right fore wing of 111, *E. saccharicola* (Gah.) and 112, *E. pulchrior* sp. n. 113-114. Propodeum and part of thorax of 113, *E. pretiosa* (Timb.) and 114, *E. rhopoideus* sp. n.

Species incorrectly placed in *Euryrhopalus* Howard

Euryrhopalus diaphorocerus Masi 1917, *Novit. zool.* **24**: 148-9, figs. 19-20 = *Coccidoxenus diaphorocerus* (Masi), **comb. n.**

This species was described from a single female. The type is located in the British Museum (Natural History). A series of both sexes was received with the following data: MAURITIUS: Reduit, i. 1950, *ex Saissetia hemispherica* Targ. (J. R. Williams). The species is hereby transferred to the genus *Coccidoxenus* Crawford: my colleague Mr. R. D. Eady concurs.

ACKNOWLEDGMENTS

For information and/or loan or exchange of material, as mostly acknowledged in the text, the author wishes to thank Dr. D. P. Annecke, Dr. F. Bachmaier, Dr. J. Beardsley, Dr. F. D. Bennett, Dr. Z. Bouček, Dr. B. D. Burks, the late Prof. G. Ceballos, Dr. M. F. Claridge, Mr. H. Compere, Prof. L. De Santis, Prof. G. Domenichini, Mr. R. G. Donald, Mr. R. D. Eady, Dr. J. Erdős, Dr. C. Ferrière, Dr. M. Fischer, the late Mr. D. T. Fullaway, Mr. J. Ghesquière, Mr. E. S. Gourlay, Dr. M. de V. Graham, Dr. A. Hoffer, Dr. E. Königsman, Dr. S. Pradhan, Dr. R. M. Quentin, Prof. O. W. Richards, Mr. E. F. Riek, Dr. D. Rozen, Dr. J. G. Rozen, Dr. B. R. Subba Rao, Prof. T. Tachikawa, Dr. V. A. Tryapitsyn, Prof. K. Yasumatsu and Dr. C. Yoshimoto. Through the kindness of Mr. H. Compere and Dr. D. P. Annecke the types of African and Asiatic species described in this paper on their material are deposited in the British Museum (Natural History). Mr. H. Compere very kindly provided the photographs and drawing for Plates I and II, and Dr. G. Viggiani very kindly made the skilful drawings for Plates III and IV and text-figures 11 and 12. Text-figures 82, 96, 103, 108 and 110 were taken or adapted from some published by Kerrich (1953) by kind permission of the Editor of the *Bulletin of Entomological Research*. Dr. D. J. Williams kindly reviewed the names of the Coccid hosts.

REFERENCES

- ASHMEAD, W. H. 1904. Classification of the Chalcid Flies or the superfamily Chalcidoidea, with descriptions of new species in the Carnegie Museum, collected in South America by Herbert H. Smith. *Mem. Carneg. Mus.* **1** (4), i-xi + 225-555 + 9 pls.
- BURKS, B. D. 1952. A new mealybug parasite (Hymenoptera: Encyrtidae). *JIN.Y. ent. Soc.* **60**: 179-182.
- COMPERE, H. 1937. The species of *Aenasius*, Encyrtid parasites of mealybugs. *Proc. Hawaii. ent. Soc.* **9**: 383-404.
- 1939. Mealybugs and their insect enemies in South America. *Univ. Calif. Publ. Ent.* **7**: 57-74.
- 1947. A report on a collection of Encyrtidae with descriptions of new genera and species. *Ibidem*, **8**: 1-23.
- COMPERE, H. & ANNECKE, D. P. 1960. A reappraisal of *Aphycus* Mayr, *Metaphycus* Mercet, and allied genera (Hymenopt.: Encyrtidae). *J. ent. Soc. sthn Afr.* **23**: 375-389.
- DE SANTIS, L. 1959. Descripción de un nuevo género y de una nueva especie de Encirtido del Brasil (Hymenoptera: Chalcidoidea). *Actas Trab. prim. Congr. sudamer. Zool.* **3**: 61-65. La Plata.
- 1964 [1963]. Encirtidos de la Republica Argentina (Hymenoptera Chalcidoidea). *An. Conn. Invest. cient. Prov. B. Aires* **4**: 11-398 + 12 Pl.

- ERDÖS, J. 1946. Genera nova et species novae Chalcidoidarum (Hym.). *Annls hist.-nat. Mus. natn. hung.* **39**: 131-165.
- FERRIÈRE, C. 1955. Encyrtides nouveaux ou peu connus. *Mitt. schweiz. ent. Ges.* **28**: 115-139.
- 1957. Die Parasiten von *Spilococcus nanae* Schmutterer in Süd-Bayern. *Opusc. zool., Münch.* **10**: 1-9.
- Ghesquière, J. 1956. Remarques taxonomiques et biologiques sur quelques Encyrtides (Hym. Chalcidoidea). *Boll. Lab. Zool. gen. agr. Portici* **33**: 683-707.
- GRAHAM, M. W. R. DE V. 1959. The identity of *Tetracnemus diversicornis* Westwood (Hym., Chalcidoidea, Encyrtidae) as shown by the rediscovery of its type; and a second British record of the species. *Entomologist's mon. Mag.* **95**: 66.
- HOFFER, A. 1959. Miscellanea Encyrtidologica III (Hym. Chalcidoidea). *Sborn. ent. Odd. nár. Mus. Praze* **33**: 5-36 + 8 Pl.
- HOWARD, L. O. 1892. Insects of the subfamily Encyrtinae with branched antennae. *Proc. U.S. natn. Mus.* **15**: 361-9 + 2 Pl. [Quotes Howard, 1890].
- ISHII, T. 1928. The Encyrtinae of Japan. *Bull. imp. agric. Exp. Stn Japan*, **3** (2): 79-160.
- KERRICH, G. J. 1953. Report on Encyrtidae associated with mealybugs on cacao in Trinidad, and on some other species related thereto. *Bull. ent. Res.* **44**: 789-810.
- 1964. On the European species of *Dusmetia* Mercet, and a new oriental genus (Hym., Chalcidoidea, Encyrtidae). *Entomophaga* **9**: 75-79.
- 1964. Comment on the proposed replacement of *Mirini* Ashmead, 1900. *Bull. zool. Nom.* **21**: 267.
- KRYGER, J. P. 1951. Notes on Chalcids II. *Ent. Meddr* **26**: 98-121.
- MERCET, R. G. 1921. Himenópteros, fam. Encírtidos. *Trab. Mus. nac. Cienc. nat., Madr.* i-xi + 1-732.
- 1922. Los géneros *Tetracnemus* y *Charitopus* (Him. Chalcídidos). *Boln R. Soc. esp. Hist. nat.* **22**: 51-54.
- 1928. Nota sobre algunos Encírtidos americanos. *Eos* **4**: 5-12.
- NIKOL'SKAYA, M. N. 1952. [Chalcids of the Fauna of the USSR (Chalcidoidea)]. *Opred. Faune SSSR, Moscow* **44**: 1-575.
- PECK, O. 1951. Superfamily Chalcidoidea. In MUESEBECK, C. F. W. *et al.* Hymenoptera of America north of Mexico: synoptic catalog. *Agriculture Monogr.* **2**: 410-594.
- ROSEN, D. 1965. A new species of *Clausenia* Ishii (Hymenoptera: Encyrtidae) from Israel. *Proc. R. ent. Soc. (B)* **34**: 61-64 + 3 Pl.
- SCHMIEDEKNECHT, O. 1909. Hymenoptera fam. Chalcididae. *Genera Insectorum* **97**. Brussels.
- TACHIKAWA, T. 1963. Revisional studies on the Encyrtidae of Japan (Hymenoptera: Chalcidoidea). *Mem. Ehime Univ.* VI **9** (1): 1-264.
- TIMBERLAKE, P. H. 1929. Three new species of the Hymenopterous family Encyrtidae from New South Wales. *Univ. Calif. Publ. Ent.* **5**: 5-18.

ADDENDUM

A paper by Man Mohan (195.6 Taxonomy of Encyrtid parasites (Hymenoptera: Chalcidoidea) of Indian Coccoidea. *Acta hymenopt., Tokyo* **2**(2): 37-97) in which that author described a new species *Ericydnus ceroplastis*, was not received in London until April 1967. Dr Man Mohan kindly sent me the unique holotype on loan. It had been dissected, and the parts mounted on two slides. The species appears to me not to conform with *Ericydnus* but, from the form of the gaster, to belong in some genus of the subtribe Anagyrina.

INDEX TO NAMES IN HYMENOPTERA

Principal references in bold type: junior or invalid synonyms in italics.

- abengouroui Risbec, **231**, 235, **235**
 Acroaspidia Compere & Zinna, 145
 acuminatus sp.n., **215**, **224**
 advena Compere, 207, **207**, 208, 209, **223**
 Aenasiina, 143, **145**
 Aenasius Walker, **189**, **195**, 239
aeneus Nikol'skaya, 172, 173
 Aglyptoideus De Santis, 145
 Aglyptus Förster, **147**, **150**, 154
 Alamella Man Mohan, 145
 Anagyrietta Ferrière, **146**
 Anagyrina, **145**
 Anagyrini, **144**, **145**, 153
 Anagyrus Howard, 154
 Anarhopus Timberlake, **147**
 Antheminae, 144
 Antipodencyrtus Kerrich, **147**
 Anusia Förster, 145
 Anusoidea Girault, **151**
 Aphycina, **146**
 Aphycini, 146
apterogenes Mayr, 170, 171, 172
 Aquaencyrtus Hoffer, **147**
 arizonensis Girault, **192**, 193, 194, 195, **195**
 Arrenophaginae, 144
atriceps Walker, 170, 171
atripes Förster, 173

baleus Walker, 174, **175**, 176, **179**
basalis Förster, 174, 175, 176
bicolor Nikol'skaya, 174, 176
biplagiatus Mayr, 167, 174, 175, 176
 Blepyrus Howard, **189**, 225
 bollowi Mercet (Parencyrtus), **153**
 bolowi Mercet (Aenasius), **219**
 Bothriothoracini, **144**
 Bothriothorax, 145
 brasiliensis Ashmead, **152**, 153
 brasiliensis (Mercet), **215**, 216, 218, **225**
 brethesi De Santis, **218**, **225**
 britannicus Alam, 175
 brounii Timberlake, 154, **159**, **165**, **166**
 bucculentus De Santis, 153

 caeruleus Brues, 196, **200**, **221**
 Calliencyrtus De Santis, **153**
 cariocus Compere, **216**, 217, 218, **225**
 carolinensis sp.n., **240**, **244**
 caudatus Erdös, 149, **169**, **176**
 ceroplastis Man Mohan, 247

 Chalcaspis Howard, **188**, 190, **191**, 212
 Chalcaspis species not named, 194, 195
 chapadae Ashmead, **210**, **223**
 chrysus Walker, 179
 Chrysoplatycerus Ashmead, 146
 Clausenia Ishii, 143, **151**, **181**
 clavicornis (Compere), 180, **225**, 226, **227**
 Coccidoxenus Crawford, 246
 Coelaspidia Timberlake, 146
 coffeicola sp.n., 156, **161**, 162, **165**, **166**
colombiensis Compere, 216, 217
 comperei sp.n. (Clausenia), **185**, **188**
 comperei sp.n. (Neodiscodes), **229**, **235**, 235
Comperencyrtus De Santis, 149, **152**
 confusor sp.n., 182, **185**, **187**
 connectens sp.n., **205**, **223**
 corrugata sp.n., **183**, 183, **187**

 diaphorocerus (Masi), **246**
 Dicarnosis Mercet, 145
dichrous Mercet, 167, 168, 169, 170
 Dinocarsiella Mercet, **150**, **151**
 Dinocarsiina, **145**
 Dinocarsiini, 145
 Dinocarsis Förster, 145, 152
 diversicornis Westwood, 154
 Doliphoceras Mercet, 145
 Dusmetia Mercet, 146

 Ectroma auctt., 147, 150, 154
 Ectromatopsis Compere, 145
 Ectromini Ashmead, 144, 153, 154
 Encyrtidae, 143, 144, 179
 Encyrtinae, 143, 144
 Encyrtini, **144**
 Ericydnina, 143, **145**, 146, 152
 Ericydnini, 145
 Ericydnus Walker, **147**, **151**, 153, 166, 179
 Eulophus Geoffroy, 179
 Eupelmidae, 179
 Euryrhopalus Howard, **190**, **235**, 239

 flandersi sp.n., **204**, **221**
 flaviclava De Santis, 152, **153**
 frontalis Compere, **209**, 210, 212, 219, 223,
 223, 224

 Grandoriella Domenichini, 143, **151**, 153, **180**
 guineensis sp.n., **184**, 185, **188**

Hambletonia Compere, 146
 hemipterus (Girault), 179
 Heteroleptomastix Ishii, **153**
hispanica Mercet, 152, 154
 Hungariella Erdős, 143, **147, 154**
 hyettus Walker, **195**, 197, 198, 202, 203, **219**
ianthinus Compere, **207, 208, 223**
 indica Ramakrishna Ayyar, **162, 165, 166**
 indicus Narayanan & Subba Rao, 232, **233, 235**
 insularis (Cameron), **226, 228**
 insularis Compere, 207, **211, 224**
 ivorensis Risbec, 180
 japonicus (Tachikawa), **169, 176**
 josefi Rozen, 182, **183, 187**
 kirkpatricki (Kerrich), 236, 237, 239, 240, 241, **241, 245**
 lamasi Domenichini, **180**
latiusculus Thomson, 174, 175, 176
 lepellei Kerrich, 228, 229, **230, 230, 231, 232, 235, 235**
 Leptanusia De Santis, 145
 Leptomastix Förster, 154
 longicornis auctt., 170
 longicornis Dalman, 168, 171, **173, 178**
 longiscapus Compere, **213, 215, 219, 224**
 lucidus sp.n., 190, **191, 195**
 maplei Compere, **197, 221**
 martinii Compere, **230, 231, 235, 235**
Masia Mercet, 149
 masii Domenichini, **204, 204, 205, 221**
 matranus Erdős, 152
 mediterranea sp.n., **158, 159, 165, 166**
 megalarus Walker, 179
 Metaphaenodiscus Mercet, **188, 190**
 Metaphaenodiscus species not named, 190
 Mirini Ashmead, 144, 152
 nemoralis Mercet, **190, 190**
 Neodiscodes Compere, 189, **189, 228**
 Neodusmetia Kerrich, **149, 150**
 Neoplatycerus Subba Rao, 146
 nitens sp.n., **211, 224**
 pacificus Compere, **212, 213, 214, 215, 224**
paludatus Walker, 167, 168
 Paraenasiodea Hoffer, 145
 Parastenoterys Girault, **153**
 Parastenoterys Girault, De Santis, 151, 152

Parectromoides Girault, 153
 Parencyrtus Ashmead, 152
Parencyrtus Mercet, 151
 parvus sp.n., **228, 235**
 paulistus Compere, 207, **210, 211, 223**
 Pauridia Timberlake, **150**
 Pentacladocerus Erdős, **149, 152**
 peregrina (Compere), 158, 159, **160, 161, 163, 165, 166**
 pergandei Howard, 191, **192, 193, 195**
 personatus sp.n., 197, **198, 200, 201, 221**
 phenacocci (Ashmead), **193, 195**
 phenacocci Bennett, **203, 204, 221, 221**
 piceae Erdős, 154, 155, **156, 157, 164, 165, 165**
 pretiosa (Timberlake) (Hungariella), 154, **155, 156, 157, 158, 159, 160, 161, 162, 164, 165**
 pretiosus (Timberlake) (Euryrhopalus), **236, 237, 243**
 propinquus sp.n., **242, 245**
 Pteromalidae, 179
 pulchrior sp.n., **238, 243**
 punctatus Compere, **201, 219, 221, 231**
 punctatus Girault, 153
 purpurea Ishii, 181, 182, **182, 183, 184, 185, 186, 187, 187**
 regularis sp.n., 200, **201, 221**
 reinhardi (Mayr), 179
 rhopoideus sp.n., **240, 243**
 robustior Mercet, **172, 178, 179**
 saccharicola (Gahan), 228, **237, 239, 240, 243**
saissetiae Yasumatsu & Yoshimura, 226
 schwarzi Howard, **237, 243**
 similis sp.n., **196, 219**
 sipylus Walker, 168, **174, 175, 176, 178, 179**
 spilococci Ferrière, **157, 165**
 strigosus (Nees), 168, **170, 171, 172, 174, 178, 179**
 subbaraoi sp.n., **232, 235**
Synaspidia Timberlake, 236
 tachigaliae Brues, 216
 Tanaostigminae, 179
 Tanaostigmodes, 179
 tenuiscapus sp.n., **239, 240, 243**
 Tetraccladia Howard, 149
 Tetracnemini, 154
Tetracnemus Timberlake, 147, 154
 Tetracnemus Westwood, **149, 152, 154**
theobromae Kerrich, 216, **217**

Tropidophryne Compere, 146

vadosus sp.n., 214, 215, 224

ventralis Dalman, 167, 168, 169, 174, 176,
176, 179

vexans sp.n., 202, 221

Vosleria Timberlake, 150

Xanthoectroma Mercet, 150

Xanthoencyrtus Ashmead, 145, 150

Xenoencyrtus Riek, 179

Zaplatycerus Timberlake, 146

Zarhopalus Ashmead, 145

INDEX TO COCCID HOST NAMES

aonidum auctt. (*Pseudococcus*)

see *longispinus* Targ.

Baccacoccus sp., 185

brevipes (Ckll.) (*Dysmicoccus*), 215, 217, 236,
243

citri (Risso) (*Planococcus*), 162, 164, 185,
187, 204, 226, 231

"citrus scale", 233

comstocki Kuwana (*Pseudococcus*), 182

conconvocerarii James (*Pseudococcus*), 183.

"Diaspine scale", 185

Dysmicoccus sp. near *brevipes* (Ckll), 242.

Ferrisia sp., 200, 201, 208, 213

fragilis Brain (*Pseudococcus*), 156, 160, 211

gossypii Towns. & Ckll. (*Phenacoccus*), 203

"grape-fruit mealy-bug", 233

hemispherica Targ. (*Saissetia*), 246

kenyae Le Pelley (*Planococcus*), 161, 162, 184

lilacinus (Ckll.) (*Planococcus*), 164, 230, 233

longispinus Targ. (*Pseudococcus*), 156, 160,
161, 211

maritimus (Ehrhorn) (*Pseudococcus*), 204

maxima Green (*Pulvinaria*), 226

"mealybug on *Albizzia*", 208

"mealybug on cotton", 205

nanae Schmutterer (*Spilococcus*), 158

neobrevipes Beardsley (*Dysmicoccus*), 245

njalensis (Laing) (*Planococcoides*), 184, 185,
187, 232

Phenacoccus sp., 181, 202, 203, 211, 240

piceae (Loew), 157

Planococcus sp., 184

Pseudococcinae, 185

Pseudococcus sp., 159, 161, 202, 208, 217,
228, 229

pulverarius Newstead (*Heterococcus*), 171,
176

quaesitus (Brain) (*Allococcus*), 229

Saissetia sp. or spp., 185, 226

solani Ferris (*Phenacoccus*), 191, 193, 238

solenopsis Tinsley (*Phenacoccus*), 193

virgata (Ckll.) (*Ferrisia*), 200, 201, 208, 209,
226, 227

yuccae (Coq.) (*Puto*), 198